A Work Project presented as part of the requirements for the Award of a Master Degree in Finance and Management from the NOVA – School of Business and Economics.

SHAPPING THE FUTURE OF MOBILITY

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Abstract

In the course of 2018, automotive players had to tackle a variety of challenges within its business environment. BMW was no exception. Given such circumstances, the purpose of this report is to assess BMW's intrinsic valuation. Likewise, both a quantitative and qualitative analysis were performed whilst regarding the shape of the future of mobility. Upon our considerations, a BUY recommendation is reached on top of three major pillars: unstoppable mobility electrification, the growth of China and the increased shared mobility.

Keywords

BMW, Automotive, Electric Vehicles, China.

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BMW GROUP

COMPANY REPORT

AUTOMOBILES

03 JANUARY 2020

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Shaping the Future of Mobility

Driven by greener mobility solutions

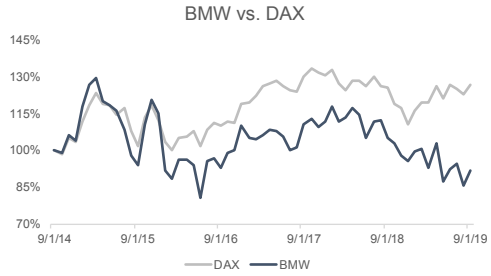
- **A key position in the electrification landscape.** BMW holds as the #3 worldwide brand in terms of combined deliveries of all-electric and plug-in vehicles. BMWi3 is the only premium car present in the top 10 most sold compact-EV models globally. As a 50% global EV adoption rate is expected by 2035, our forecasts translate into a CAGR of 13.95% of increased total deliveries of electrics and others.
- **A privileged stance in China.** As customers develop deeper loyalty to brands in the growing Chinese car market, leading autos are taking as nearly as 80% market share. BMW is stated as a preferred EU brand, well-positioned to capture the growth opportunities in a market expected to grow at a CAGR of 3.68%. Additionally, BMW's top luxury vehicles are gaining favour amongst ultra-high-net-worth Chinese customers.
- **Shaping the future of shared mobility.** BMW holds a favoured positioning to prevail as a mobility leader, through the development of future-oriented products and services, such as the ones promoted in the collective 1 billion joint ventures with Daimler. Such is crucial for securing future revenue streams, increasing brand loyalty and sales retention.
- **Well placed to mitigate the risks from possible trade conflict.** With the recent announcement of the additional 25% acquisition of BMW Brilliance, the Group will be the first foreign carmaker to take control of its joint venture company in China. This deal will help BMW lessen the impact of higher tariffs imposed during the trade fight, as it now plans to boost manufacturing capacity in China and expand local production of models, including electric cars.

Recommendation:	**BUY**
Vs Previous Recommendation	*HOLD*
Price Target FY20:	**82.58 €**
Vs Previous Price Target	*n.a.*
Price (as of 2-Jan-20)	**74.20 €**

Reuters: BMWG.DE, Bloomberg: BMW GR Equity

52-week range (€)	78.30-58.04
Market Cap (€m)	47,380
Outstanding Shares (m)	608.00

Source: Bloomberg



Source: Bloomberg

(Values in € millions)	2018	2019E	2020F
Revenues	97,480	96,008	99,838
EBIT	10,201	8,050	8,340
NOPLAT	5,071	3,638	3,904
Net Income	7,240	5,503	5,794
FCF	-3,182	2,812	2,475
Total Assets	196,987	199,676	204,465
Total Equity	57,559	58,025	59,037
EPS	11.01	8.37	8.81
ROIC	20.19%	12.86%	14.78%
EBIT Margin	10.46%	8.39%	8.35%
EV/EBIT	13.50x	14.63x	11.77x

Source: Analyst Estimations

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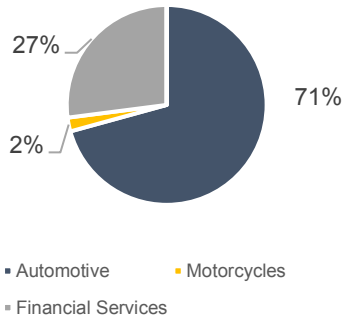
Company Overview

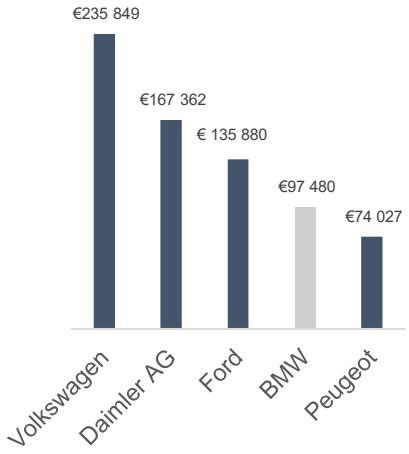
Company Description

Exhibit 1: Revenues per Segment



The creation of BMW traces back to 1916, with the merger of Flugmaschinenfabrik Gustav Otto, an aircraft manufacturer, into Bayerische Flugzeug-Werke AG (BFW AG). In 1917, Rapp Motorenwerke, another aircraft manufacturer, was restructured into Bayerische Motoren Werke GmbH (BMW AG). Finally, in 1922, BMW was bought by the owners of BFW. Today, the Group consists mainly of three premium vehicle brands, **BMW, MINI and Rolls-Royce**, and produces more than nineteen different models of automobiles and eight of motorcycles. It is subdivided into three operating segments: **Automotive, Motorcycles and Financial Services.** Additionally, the company registers the values for holding companies and the Group's financing companies in the "Other Entities" segment.

Exhibit 2: Sales of the largest vehicle manufactures in 2018



The automaker is best known for producing **premium BMW automobiles and motorcycles**, but it was only in 1923 that BMW produced its first motorcycle, until then the company was specialized in jet engines. It was not until 1928, with the acquisition of Fahrzeugfabrik Eisenach, that the company became an automaker. BMW Group's resilience and innovation mindset helped shape the company into being **one of the most recognized worldwide premium car and motorcycle manufacturers**. In 2019, the company **ranked third in terms of sales**, among the biggest German automakers, behind Daimler AG and Volkswagen Group, with 2.10 million cars delivered. The company's revenue has been growing since the subprime crisis in 2008 and 2009, with an associated CAGR of 5.45%. Sales growth has slowed down (for the last five years CAGR equals 3.93%), yet this fall, new registrations show it was felt industry-wide (approximately 6.80%). The cars that suffered the most were diesel cars, whose sales fell by 30%, mainly due to growing environmental concerns and fear of future tougher restrictions to combustion engine vehicles. However, as BMW was, in 2018, **the worldwide number one brand in terms of combined deliveries of all-electric and plug-in hybrid vehicles,** this might be good news. From 2010 to 2018, the Group's automotive unit sales rose from 1.46 million to 2.49 million units, from which 142,617 (5.70%) were electric and hybrid vehicles (103,080 units in 2017, +38.40%). To highlight, **BMW plug-in hybrid models were the ones to contribute the most to this performance**, with a total of 91,853 units delivered (2017: 63,605 units; +44.40%). Meanwhile, deliveries of the electrified MINI Countryman, available since June 2017, totalled 13,219 units (2017: 5,799 units; +127.95%). Regarding the motorcycle segment, deliveries rose for the **eighth consecutive year** to a record level of 165,566 (+0.90%).

Exhibit 3: Sales of Electrified Vehicles

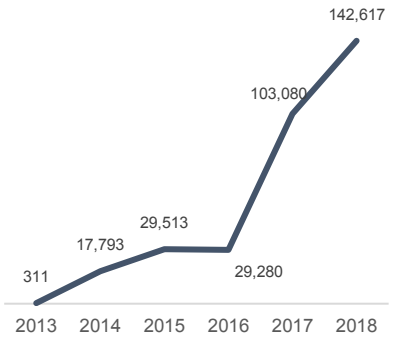


Exhibit 4: Sales Evolution per Geography

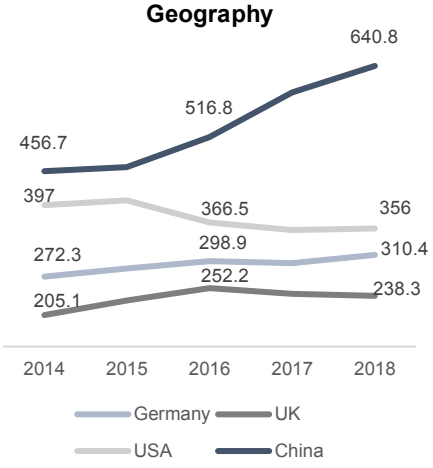


Exhibit 5: Geographical distribution of BMW's Automotive sgement unit sales

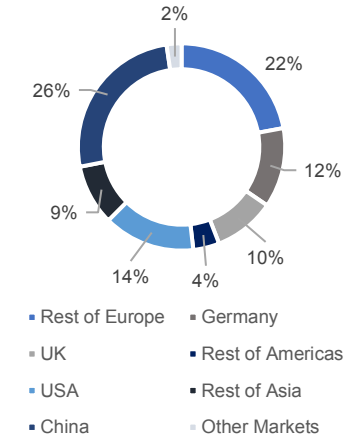
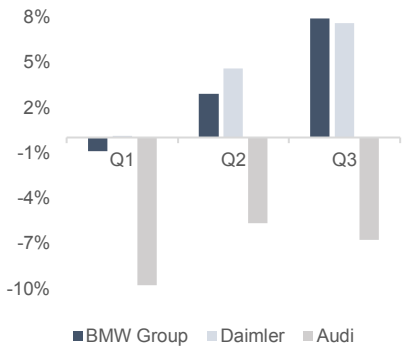


Exhibit 6: Revenue growth for BMW and peers for the first three quarters of 2019



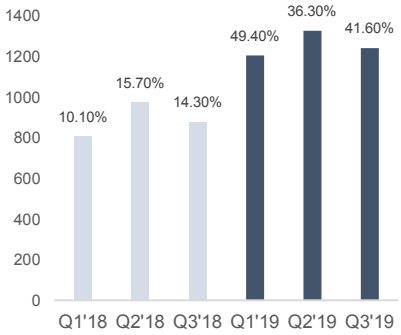
BMW sales growth has been driven mainly by the **fast-growing emerging markets such as China**, which already represents 25.70% of automotive unit sales, with 640,803 units delivered in 2018 (2017: 595,020 units, +7.70%), making it the single largest market for BMW.

BMW's shares are quoted on the Frankfurt Stock Exchange. The BMW Group **stock performance** saw a downfall in 2018 due to political uncertainties, such as trade disputes and instability in Europe. The main investor uncertainty sources were the risk of an increase in tariffs between both the EU, China and the United States, Brexit and general automakers decrease in EBIT margin. In fact, BMW was particularly exposed to the uncertainty of a possible trade war, as it is a **large exporter of vehicles from the US to China,** (approximately 100,000 vehicles shipped in 2018). Nevertheless, the company is **countering this exposure by increasing their share of BMW Brilliance,** making it the first foreign company taking control of its Chinese joint venture, responsible for the production of BMW vehicles sold in China. Additionally, the EBIT margin of BMW decreased from 10.07% (9.20% on the Automotive segment)[1] in 2017 to 9.36% (7.20% on the Automotive segment). This decrease in EBIT margin of the overall company and most importantly, the automotive segment, puts the company's future profitability at risk. Nonetheless, the **Group's cost-cut plan –** which will be further discussed ahead – will play a **key role in mitigating this exposure**. Automakers upfront expenditures in new technologies and the new emission standards also contributed to the weakening of the **Automobile Index**, which fell by 27.20% in 2018. Despite following the market's negative trend, BMW Group's **common stock** outperformed the sector index, with a price decrease of 18.60% since the beginning of the year and a closing price of 70.70 EUR (86.83 EUR in 2017). The **preferred stock** registered a similar downfall of 16.80%, closing at 62.10 EUR per share (74.64 EUR in 2017). BMW Group's market capitalization is now 47.78 billion EUR, being amongst the **ten most valuable German enterprises** listed on the stock market.

BMW automotive segment revenues have seen a slight decrease (-0.90%) in the first quarter (Q1) of 2019, followed by a more significant increase (+2.90%) in Q2 and Q3 (+7.90%)[2]. Although **BMW has performed better in terms of unit sales** when compared to its most direct competitors, it did not outperform Daimler in terms of revenues' growth for the first two quarters: Daimler (Q1: +0.00%; Q2: +4.60%; Q3: +7.60%). BMW did, yet, outperform Audi (Q1: -9.80%; Q2: -5.70%; Q3: -6.80%). The company has recently changed CEO, from Harald Krueger to Oliver Zipse, thus the third quarter, first quarter under the charge of the new CEO, had investors' attention. The company surpassed expectations, with not only **revenue growth exceeding that of its**

1 Values considered before reformulation.
2 When compared to the same quarter of 2018.

Exhibit 7: Rolls-Royce Sales Evolution



main competitor for the first time in a couple of quarters, but also an outstanding **32.90% jump in EBIT** when compared to Q3 2018. The revenue growth is mainly due to the **successful luxury segment** and the **increased customers' adherence to certain high margin models** such as the new BMW X vehicles (+23.10%), the popular BMW 3 Series Sedan (+33.70%) and Touring (+21.60%). Additionally, customers interest in electrified vehicles is continuing to grow. For November, sales of BMW Group's EV models, namely plug-in hybrid models, rose by +20.30%, with an emphasis on the BMW i series (+18%) and the new Mini electric (+50%), on a YTD vision. **EV sales increased by 2.30%.** Another factor contributing to these positive results is the recent cost-cutting initiative, that will be further discussed, yet the company is far from its target profit margin of 8%, with only 6.60% in Q3 2019.

In turn, Rolls-Royce has experienced **fast growth in unit sales** for all quarters of 2019 (Q1: +49.40%; Q2: +36.30%; Q3: +41.60%), following the positive trend already experienced in 2018 - year when the record of 4,107 units delivered was achieved. This success is mainly due to **increased sales in the Chinese market**, which became Rolls-Royce's second-largest market and is expected to rise to #1 anytime soon. The brand's top luxury vehicles are gaining favour amongst **ultra-high-net-worth Chinese customers, who are willing to pay for the extra personalisation options and comfort.** In fact, Phantom, Rolls-Royce's most expensive model (approximately 550,000 USD) has more sales in China than anywhere else in the world.

Exhibit 8: Shareholder Structures

Free Float	53,2%
AQTON SE investments[3]	9%
AQTON GmbH & Co. KG investments[4]	16,6%
Susanne Klatten Beteiligungs GmbH[5]	20,7%
Susanne Klaten	0,2%
Stefan Quandt	0,2%

b. Shareholder Structure

The shareholder structure of BMW is relatively concentrated, **with fixed holdings accounting for 46.80% of shares**. The two largest shareholders, Stefan Quandt (25.83%) and Susanne Klatten (20.90%), are siblings and hold **30.30% of the company's voting rights**. After the passing of their mother, Johanna Quandt, Susanne was awarded the voting rights of 49.30 million BMW shares (approximately 12.70%), and Stefan with the voting rights for 50.70 million BMW shares (circa 17.60%). The newly attained shares give Stefan Quandt a "blocking minority" in the BMW Group, worth 13.40 million EUR. The remaining **53.20% of shares are publicly traded**. This includes shareholdings below 5%, which are not entitled to vote, and thus are considered as free float. In terms of the geographical distribution of institutional equity investors, there is a clear **predominance of European** (58.40%) **and North American** (35.50%) investors. Note that institutional holdings represent 266 million ordinary and preferred shares out of 658 million outstanding shares.

Exhibit 9: Institutional Shareholders Geographical Distribution

Total North America	**35.50%**	Canada	1.80%
		US	33.70%
Total Europe	**58.40%**	UK	21%
		Germany	13.90%
		France	7.80%
		Norway	3.90%
Total Asia	**4.80%**	Japan	2.10%
		HK / China	1.40%
		Singapore	0.80%
Rest of the World	**1.20%**		

3 Controlled company whose voting rights belong to Stefan Quandt.
4 Controlled company whose voting rights belong to Stefan Quandt.
5 Controlled company whose voting rights belong to Susanne Klatten.

Exhibit 10: Number of Units Sold per Brand

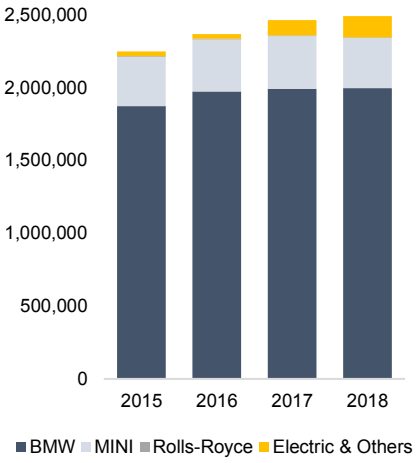
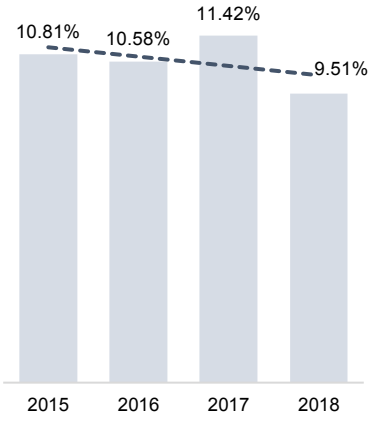
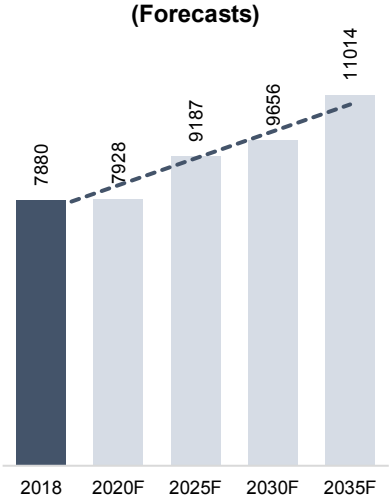


Exhibit 11: Automotive EBIT Margin (%)



Exhbit 12: SG&A Costs (Forecasts)



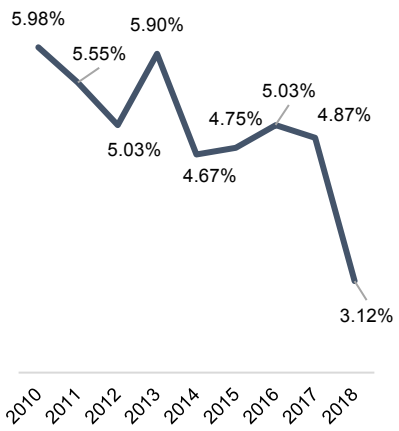
c. Business Model

The BMW Group operates exclusively on the premium segment, but its core brand **services a wide range of customers** from environmentally conscious to high-performance enthusiasts. This requires the company to focus on innovation, sustainability and on the ideal "vehicle of the future". The Group is committed to developing **future-oriented vehicles and services, targeting topics such as electric mobility, digitalization and autonomous driving.** Regarding the latter, BMW plans to provide highly automated driving by 2021. Meanwhile, the company has continuously developed seamless digital services, such as personalized and context-based information within the vehicle, virtual reality options to configure one's car, and an intelligent platform that will facilitate switching vehicles based on one's customer profile. Another strategic investment concerns the energy efficiency of both automobiles and motorcycles. The development of top technology combustion engines and lightweight construction allows for reduced fuel consumption and vehicle emissions.

In a tentative to safeguard its profit margin, BMW has been working on a cost-cutting initiative, **Performance > NEXT,** since 2017 which has already proven to be fruitful. Looking at the Q3 2019 results, BMW's EBIT margin for automotive increased from 4.40% to as high as 6.60% YTD. The Group has been extending its efforts towards this initiative in recent quarters, by taking measures that will save the company more than **12 billion EUR** by 2022. Firstly, the company is aiming towards reducing product complexity and adopting more flexible vehicle architectures, by dropping half of the traditional drivetrain and gearbox combinations in the next two years. In light of product simplifications and increased use of software simulation, new vehicle development is undergoing a significant efficiency boost. Namely, the **development times of new vehicles are expected to decrease by one-third.** Moreover, digital simulations and virtual validation can still **phase out the need for approximately 2,500 prototype vehicles by 2024**.

Additionally, as the company plans to sustain a diversified vehicle offer, current plants are being adapted to sustain the flexible production of combustion, fully electric, and plug-in hybrid vehicles. These structural changes are expected to **decrease overheads and reduce the management board size** by one person (from eight to seven). Moreover, BMW plans to **keep the workforce at the same level as 2018**. Thus, to compensate for the hiring of skilled specialists, the staff force was reduced by 1,500 through mandatory early retirement. There is still the possibility to let go of 2,500 staff members, further restricting workforce costs. Still regarding workforce-related efforts, the sales division was reformulated in April 2019, to combine the three Group's brands, reducing both space, office and people costs.

Exhibit 13: Global EBIT Margin (%)

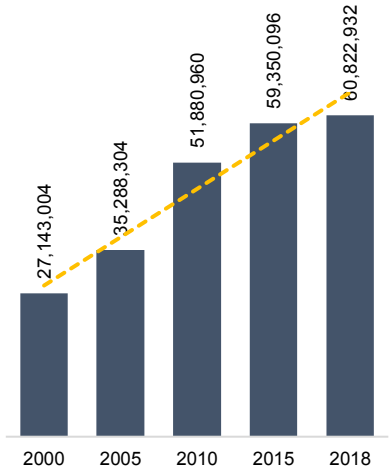


Overall, the company aims to achieve an **EBIT margin between 8% and 10%** for both automotive and motorcycle segments and a **ROE of 14%** on the Financial Services segment. Nonetheless, in our view, these expectations are over-optimistic for the automotive segment - even though we recognise the efficiency of this cost-cutting initiative. Therefore, in our model we consider a **7% EBIT margin for autos** to prevail in the future. Note that a 3.10% average EBIT margin was observed in the global auto industry in 2018, which has been following a downtrend. BMW has been able to maintain a certain degree of profitability, both by taking advantage of its premium status and through innovative cost-cutting initiatives, such as the one described above. In the case of motorcycles, we believe BMW will meet expectations, hence keeping **an 8.60% EBIT margin in the long run.**

Automotive Market

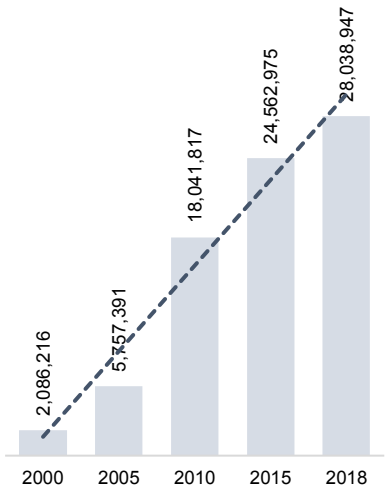
a. Overview

Exhibit 14: Global Total Automotive Deliveries



The automotive industry, one of the world's largest economic sectors by revenue, has a significant role in the global economy and is the most important segment for BMW[6]. It has been growing at consistent and relatively robust positive figures, particularly after the 2008 financial crisis. An attractive combination of **high-volume growth, a product mix that favours higher-margin vehicles and the breakthrough of the Asia Pacific** - mostly China - were among the major drivers.

Exhibit 15: China Total Automotive Deliveries



China took the centre stage in recent years and soon became a key market. Nowadays nearly 30% of global industry profits come from the region and it is the single largest market for BMW, which holds a privileged position in the country. **Even with car sales in the Chinese market decreasing in 2018 (-3.12%), for the first time in decades, BMW was capable of presenting a near two-digit positive growth (+7.70%).** As the Chinese auto market gets more concentrated and demanding, BMW has been able to position itself as a preferred European brand, not only premium but also luxury. Moreover, the Group has maintained its robust position in the region despite a recent cool-down of the market attributed to weak credit growth, a rise in used car sales and new emissions standards.

Amid this slowdown in Chinese demand, structural environmental concerns over diesel cars and the growth of the sharing economy, 2018 revealed the first negative figure since the 2008 financial crisis for global car sales. Total **global sales** amounted to 60.82 million cars (2017: 64.43 million cars; -5.60%)[7], with the first signs of a **slowdown** becoming evident. A downtrend in global demand is one of the major bottlenecks. The demand for

[6] In 2018 automotive revenues corresponded to 70.73% of the Group's revenues.
[7] Source: Bloomberg BI for Automotive.

Exhibit 16: RR Evolution

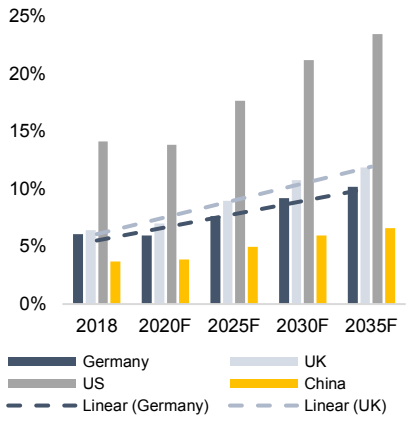


Exhibit 17: RCP Evolution

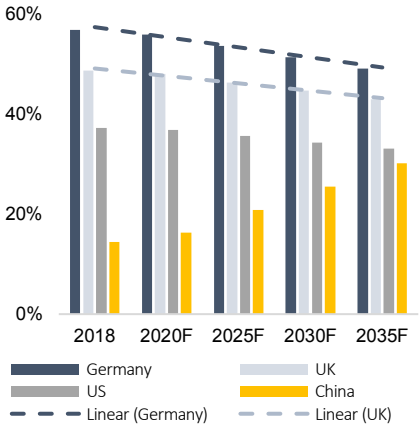
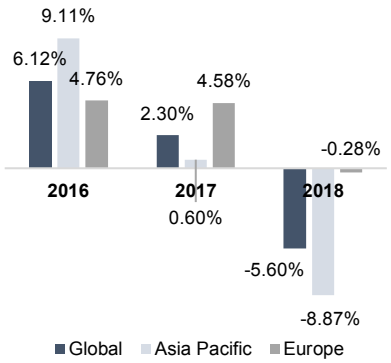


Exhibit 18: Automotive Deliveries Growth per Region (%)



personal cars can be estimated through the change in population and the average **RCP**[8], while the demand for service cars can be assessed through an analogous rate, the **RR**[9]. Trends such as **e-hailing and car-sharing** are perceived by the market as a threat, which ultimately has resulted in many pessimistic views regarding the sector. Figures point out that, on average, every shared car takes 9 vehicles out of the road[10].

Nevertheless, even though these services negatively influence the RCP (which decreases with demand) there is also the other side of the coin. Fewer cars per person mean each car is further exploited. So, the RR increases, which has an opposing effect (as the RR increases so does demand). Shared cars are used approximately 6 times more than a regular vehicle. It is estimated that shared engines are used 3 hours per day, on average, versus the 35 minutes of a privately-owned car. In our model, we reflect an average of 2.5 years of useful life for a shared automotive[11] when compared to the 15 years of useful life of a typical Internal Combustion (IC) vehicle. This implies a higher RR. For this reason, we still expect global car sales **to continue to grow, although at a lower rate (~2%)** when compared to the average growth of the last five years (3.60%)[12]. The evolution of the RCP and RR per geography will be further discussed ahead in the report, as it depends on each region's consumer preferences, regulation and willingness to adopt the solutions of the future of mobility.

Nonetheless, we believe this growth will be differently captured depending on the positioning of each player in the sharing mobility segment. It can be a deal-breaker for players that do not adapt accordingly in such a fast-paced environment. The **auto-players best positioned to meet consumer preferences in this sharing economy trend will be the ones more capable of benefiting from the positive effect of an increasing RR.** BMW and Daimler recent cooperation, that comprises five joint ventures, shows the urge of both players to do so. This partnership ranges from autonomous driving to car-sharing and parking aids and combines the efforts of 14 successful brands. The service already benefits from a pool of **60 million active users** and has high profitability prospects. With this network of joint ventures, BMW and Daimler are successfully tackling the major trends in the industry. For this reason, we are optimistic BMW will prevail as a **relevant player in the future of mobility,** capable of capturing car sales growth of at least the aforementioned 2%.

8 Rate of Cars per Person (Passenger Vehicles in Use / Total Population).
9 Rate of Replacement (Destroyed Cars / Passenger Vehicles in Use).
10 Source: SHARE NOW, by BMW and Daimler.
11 We assume shared vehicles to be driven 8 hours per day at a speed of 30 km/h.
12 McKinsey Report in collaboration with Stanford University.

b. The Future of Mobility

Exhibit 19: Largest Markets for Connected Car Sales (%)

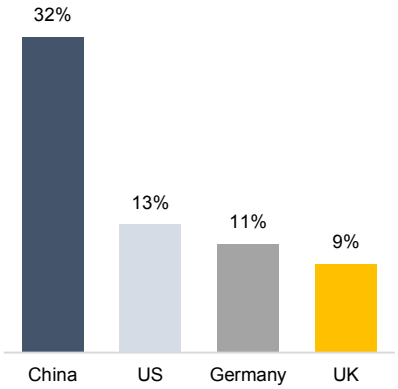


Exhibit 20: Shared Vehicles Weight (%) (Forecasts)

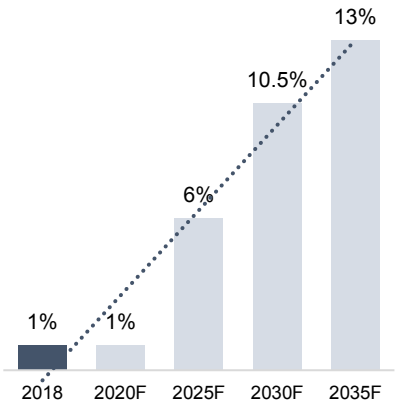
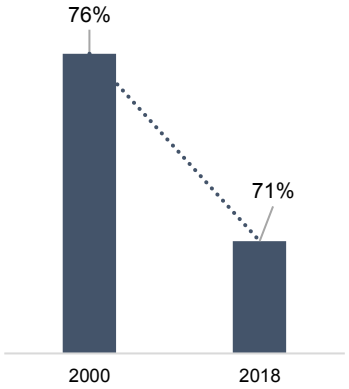


Exhibit 21: US Driver Licenses (%)



Individual mobility is being reshaped. Trends such as digitalisation, connectivity, cooperation, electrification and regulations are deemed to revamp it. Their impact on **demand**, **global sales** and **EBIT margin** will be determinant for the industry attractiveness and profitability.

Digitalisation & Connectivity: As Harald Kruger mentioned in BMW's 2018 Annual Report: "Digitalisation is changing every industry and every aspect of our lives." As such, digitalisation and connectivity are perceived as a **key trend and a top priority**[13]. Connected vehicles provide autos with the opportunity to establish beneficial relationships with customers over the entire ownership cycle and **secure future revenue streams**. Market leaders will require **seamless, individualised, safe and on-demand human-machine interfaces** (CASE[14]). The global automotive market is already revealing a **rise in the adoption of connected vehicles**. The largest markets for connected car sales are China (32%), US (13%), Germany (11%) and UK (9%) - all primary markets for BMW.

In this sense, we believe BMW holds a favoured positioning to prevail as a mobility leader for the premium car segment. It is worth highlighting the Group's recent partnership with Daimler, which provides five different services. These will allow BMW to further engage with actual consumers and potentially new ones. At the end of the day, the brand is in contact with the premium segment but also the mass market. **REACH NOW** app offers multimodal services – customers can buy transport tickets from many providers and choose between car, taxi or bike-sharing. **CHARGE NOW** offers cross-border fast-charging stations for EVs (fully charged car-battery in 30 minutes). **FREE NOW** provides a taxi ride-hailing service that includes micro-mobility options, such as e-scooters. **PARK NOW** allows customers to pay meters through the phone and find and reserve parking spots. Lastly, **SHARE NOW** is a car-sharing provider with several EVs options. The conglomerate of services is addressing the new consumers' preferences in the paradigm of shared mobility - in particular in dense urban environments, that proactively discourage private car usage. It is important to notice that any consumer in an urban area can easily access these services, as they are not exclusively directed to the premium segment.

Having said this, we expect **up to one out of ten cars sold in 2030 to be a shared vehicle**. Evidence shows a decrease in the importance of private car ownership in detriment for shared mobility. In the US, the percentage of driver licences[15] dropped from

[13] Source: KMPG 2019 Automotive Executive Survey.
[14] Connected, autonomous, shared and electric.
[15] Such indicator is measured considering a threshold of 16 years old to 24.

Exhibit 22: Average Revenue per Car Delivered

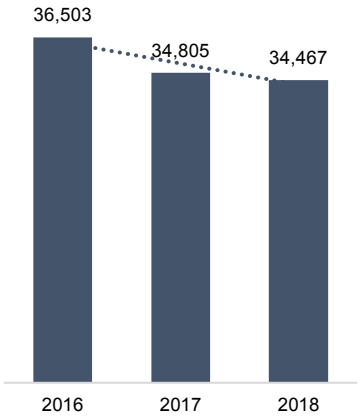


Exhibit 23: Average Revenue per Car Delivered (Forecasts)

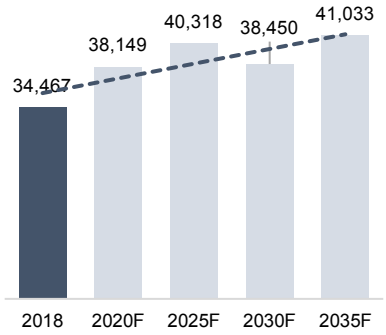
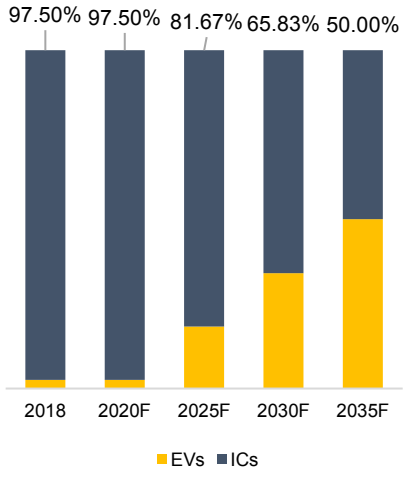


Exhibit 24: Electrification Trend (Forecasts)



76% (2000) to 71% - while the number of car-sharing in North America and Germany has grown by more than 30% annually over the last five years.

On the bright side, according to McKinsey and Stanford, connectivity services[16] and feature upgrades could **expand automotive revenue pools by as much as 30%, adding up to 1.50 trillion USD in potential revenue by 2030**. When comparing these values to the 5.20 trillion USD from traditional car sales and respective products and services, one can say this potential is significant. Together these revenues could accelerate **annual automotive industry growth to 4.4%** (2010 to 2015: 3.6%) – a higher engagement with the final consumer and consequential enhanced brand loyalty is the main argument.

Having said this, we believe these **alternative sources of revenue will mitigate the lower car selling prices practiced for car sharing purposes**. Thus, we deem that BMW will be capable of maintaining its current average revenue per car. Additionally, these services will allow BMW and Daimler, to **promote the sale of their vehicles** - hence benefiting from the previously mentioned increase in RR and sustaining their market shares on the geographies they currently operate in. When thinking of a car-hailing service such as Uber, for example, an Uber driver might choose whichever car brand to drive. For BMW-Daimler, all five services are exclusive to their Group brands. This **exclusivity will be key for brand loyalty and sales retention**, minimizing cannibalization. Lastly, note that both BMW and Mercedes-Benz are the preferred brands in China, which is the geography more prone to adopt connected vehicles and the one with the highest growth opportunities.

Electric Mobility: The global EV industry has accomplished major achievements in a short time, driven by **regulatory pressure, strong technical innovation in batteries and a great investment in EV platforms**. In 2018, EV sales reached 2 million units globally (+63% YoY), with a stable ratio of battery electric vehicles to plug-in hybrids. Despite EV's global **penetration rate still being 2.2%**, we expect a rapid acceleration to take place, mostly driven by regulation and consumer preferences towards less polluting and carbon-free alternatives. Plus, we expect BMW to remain as a top player in the field. The Group is investing in transforming their product mix, to include **25 electrified vehicles, of which more than half will be fully electric models by 2023.** Electric and plug-in hybrid car sales for BMW grew at a CAGR of 51.63% from 2014 to 2018, and by the end of 2018 electrified vehicles represented a proxy of 6% of the Group's total automotive deliveries.

[16] Such as Telematics (technology of sending, receiving and storing information via telecommunication devices in conjunction with effecting control on remote objects) and Infotainment (news, music, video, social networking).

Exhibit 25: EVs & Others Weight on Total Deliveries by 2035 (Forecast)

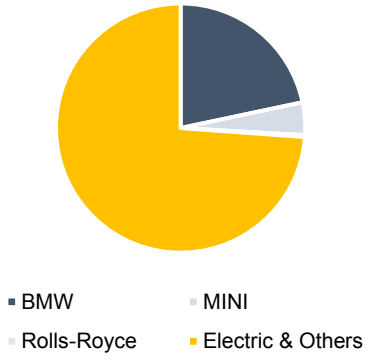


Exhibit 26: Electric & Others Average Revenue per Delivery (Forecasts)

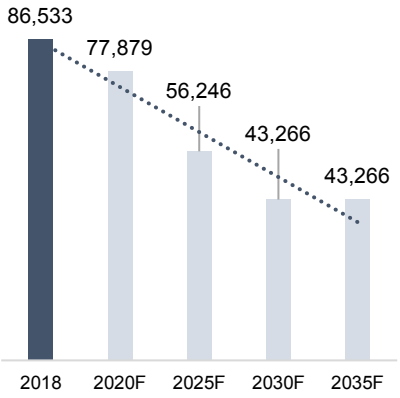
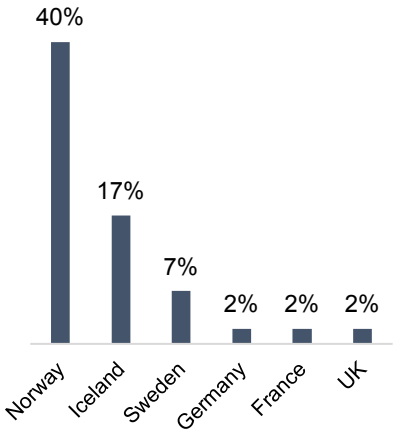


Exhibit 27: EVs Market Share in Europe (%)



BMW is part of a successful partnership, **IONITY**, founded as a joint venture between four of the biggest carmakers: BMW Group, Daimler AG, Ford Motor Company and Volkswagen Group. IONITY was created to power EVs all over Europe by constructing and operating several **high-performance battery charging stations**[17]. This progress allowed BMW to strengthen its position in EV deliveries. Likewise, we forecast BMW's **electrified cars sales to correspond to a proxy of 53%** of the Group's automotive total deliveries by 2030 and to 73% by 2035. For the car industry overall, we expect a 50% adoption rate by 2035. Thus, our figures reflect our belief that BMW will be at the forefront of the EVs market and capable of capturing a higher slice of the market. From 2019 to 2035, our forecasts translate into **CAGR of 13.95% of increased total deliveries of electrics and others** (e.g. Hydrogen cars). Keeping in mind the higher costs associated with EVs, we also acknowledged the higher price-mix of these vehicles. We believe these prices should stabilize towards current diesel car prices by 2025.

Meanwhile, regarding electrification, it is important to recognise its adoption varies across geographies and influences the Group's product-mix. The **European EV market has experienced moderate growth in 2018 (+90,000 units),** despite individual cross-country disparities between the Nordic countries and typically large markets. In Europe, Norway perseveres ahead of other markets and it is close to mass market adoption (40% market share), followed by Iceland (17%) and Sweden (7%). On the other hand, large markets such as Germany, France and the UK, keep lagging behind, with EV market shares of ~2%. Nevertheless, countries such as Germany aim to change this paradigm. The government of Angela Merkel proposed to **ban new diesel car sales as soon as 2030**, in order to incentivise the adoption of EVs. Also, subsidies will be extended into five years, to 2025. Nevertheless, even though we believe the government will be successful in implementing this measure, we perceive 2030 to be too ambitious. Likewise, in our model, BMW's deliveries in Germany will only be fully non-diesel by 2035 - a five-year delay similar to the current extension of the German subsidies for non-IC. The possible structural barriers, such as the 25 billion EUR cost for the country's power grid update, were also taken into account. Still in Europe, we think the UK would be capable of meeting its 2040 new diesel car sales ban in due time. Therefore, by 2035 a proxy of **75% of BMW's deliveries in the UK will be non-IC vehicles.**

Looking at the US, the **market roughly doubled its EV sales to 360,000 units,** mainly due to Tesla's Model 3. In 2018, for the first time in the US, an EV model sold as much as an IC one – showcasing EVs can be attractive alternatives to gas-powered cars for premium and mass-premium buyers. Nevertheless, sustainable market growth in the US will rely on regulatory developments regarding the rollback of 2025 fuel-economy

[17] As a result of the IONITY partnership, more than 400 charging points are expected to be implemented by 2020.

Exhibit 28: EV Global Penetration Rate

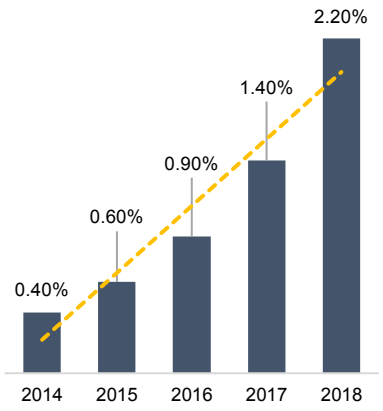


Exhibit 29: China - Light EV Sales Evolution

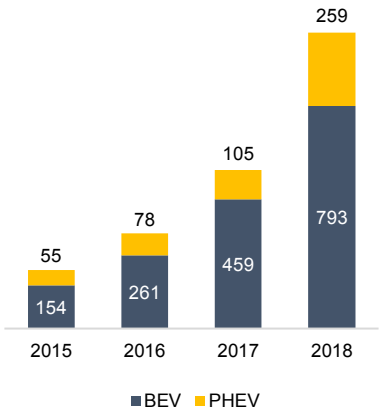
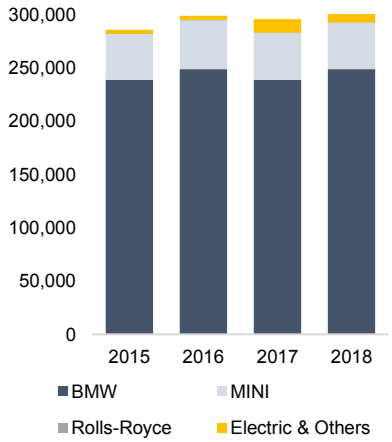


Exhibit 30: Germany - Number of Units Sold per Brand



standards, as well as state authority under the Clean Air Act. As we see incentives in the US not being as high as in EU countries, we considered that only **50% of BMW's deliveries in the region would correspond to non-IC engines**, amid a lower adoption of electrified mobility.

Lastly, the Chinese EV market grew 85% over 2018 - quite above the industry average. The market experienced **healthy growth**, regardless of a subsidy cut by the government early that year. Standing at 1.10 million units, representative of 51% of global EV sales in 2018, **China's EV market is now about three times the size of the EU and US markets individually.** Additionally, some provinces in China, like Hainan, plan to ban the sale of new diesel cars as soon as 2030. The Republic of Taiwan also proposes a ban, but only for 2040. Plus, the "China VI" vehicle emission standards are one of the **world's strictest rules on automobile pollutants and will be fully applicable from January 2020.** Compared with the "National V" standards, the new rules demand substantially fewer pollutants and the introduction of limits on particles. Despite tougher rules, the market is accomplishing a smooth transition. Chinese authorities have announced that the tax exemptions on new EV purchases will continue through 2020 to boost the country's green development and retain a strong domestic market. Alike Germany's situation, we believe the 2030 deadline to be too ambitious, even for such a fast-paced country. Hence, in our model, we reflect the full adoption of electrified vehicles only by 2040. It is important to notice that China's support for EVs has been fading out, with subsidies being cut entirely by 2020. Therefore, the growth rate of adoption for EVs should slow down.

c. Market Analysis by Geography

In order to fully understand the outlook for the automotive industry and, particularly for BMW, it is important to take a geographical perspective on demand - through the development of the RCP, RR, market share and electrification.

Germany: Germany is one of the primary markets for BMW, representing 12.46% of the Group's total deliveries in 2018, right after China (25.73%) and the USA (14.29%). From 2008 to 2018, **BMW grew at a CAGR of 0.91% in this market**, representative of Germany being a mature region for the Group. As BMW has successfully expanded to other geographies, in the search for growth opportunities, its **dependency on the German market became smaller**. Note that by 2008 the German market represented about one-fifth of the firm's total deliveries, about one and a half times more than the current value.

In our model, a **CAGR of 2.34% for the Group's deliveries** from 2019 to 2035 is expected, driven by a growth in the German car market and the preservation of the Group's market share in the region. Additionally, we expected the firm to decrease even

Exhibit 31: Germany RCP

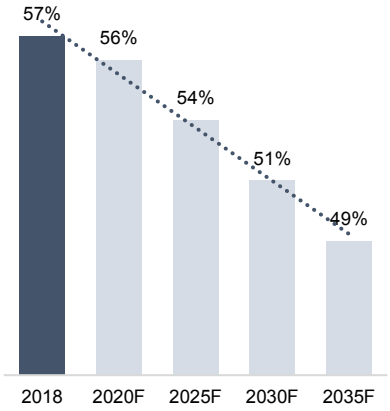


Exhibit 32: Germany RR

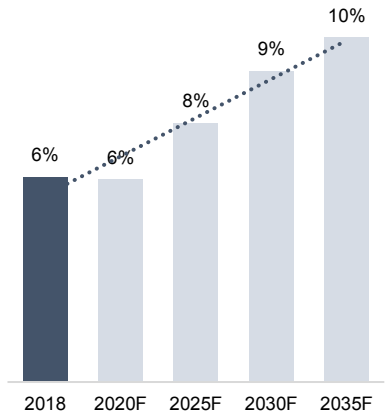
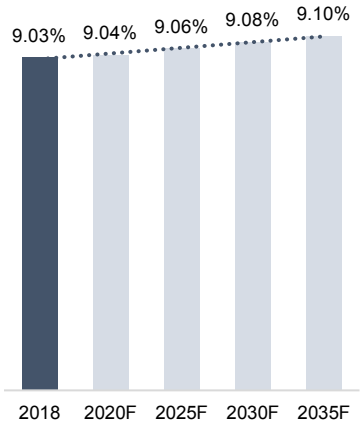


Exhibit 33: Germany Market Share



more its dependency on the German market, with it being representative of only **11.60% of the Group's total deliveries by 2035**. The increased presence in other geographies is, again, the major argument.

As previously explained in the report, the demand for automobiles is forecasted through the analysis of the population growth, RCP and RR development. In the case of Germany, after analysing the development of the country's population, RCP and RR we forecast that the **German car market will grow at a CAGR of 2.30%** from 2019 to 2035, compared to 0.97% CAGR of the past decade.

Taking a closer look at the German RCP, it has been following an upward trend, from 50.3% in 2008 to 56.9% in 2018. It is important to note that this is the highest value registered for any primary geography where BMW operates. A later adoption of e-hailing and car-sharing solutions and the historic German passion for autos are some of the motives. Having said this, we expect **German's RCP to converge to the current UK values by 2035, thus at a proxy 49.1% figure**[18]. Note that the adoption of car-sharing solutions in the UK happened earlier and, therefore, we considered it as a relevant benchmark (RCP:48.80%, 2018). Despite German customers highly valuing the performance of the car, we still believe that the convenience and benefits of the sharing economy, particularly in the urban areas, and the environmental advantages of these solutions will change the German mobility paradigm within the next 15 years.

The RR has also been following an upward trend. At the beginning of the period under analysis, a RR of 5.6% was verified versus current values of 6.1%. Germany is the region with the second-lowest RR figure (right after China, with 3.7%), for previously mentioned reasons. If cars are not further exploited one cannot expect figures as high as the ones in the US (RR: 14.1%, 2018) where car-sharing is a reality since Uber started to officially provide their services in 2011. Hence, considering Germany's adoption of e-hailing solutions and the auto product-mix of the country we expect an **RR of 10.2% by 2035** - still below current US values. With this, and considering a population CAGR of 0.05%, we arrive to a German car market growth figure of 2.3% CAGR, as previously mentioned. This result indicates that the growth in population and the RR are more than enough to compensate for the shift towards car-sharing services in this geography.

Lastly, this growth figure is supported by a preservation of the current **9% market share in Germany** - roughly the average value of the past decade. In Germany, Volkswagen (VW) is the leading brand, followed by Mercedes and, only then, by BMW. Nevertheless, as **BMW is the most prepared brand to deal with the new WLTP regulations,** we believe this will benefit the Group against current German competitors and new players, such as Tesla. Stricter EU regulations on CO_2, adopted by April 2019, aim to reduce

[18] This outlook corresponds to a -0.46% decrease in the German RCP per year.

Exhibit 34: Germany Population

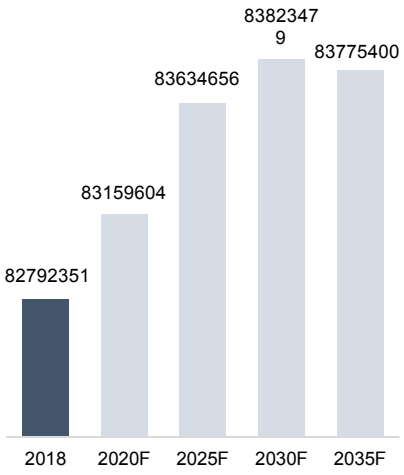


Exhibit 35: UK RCP

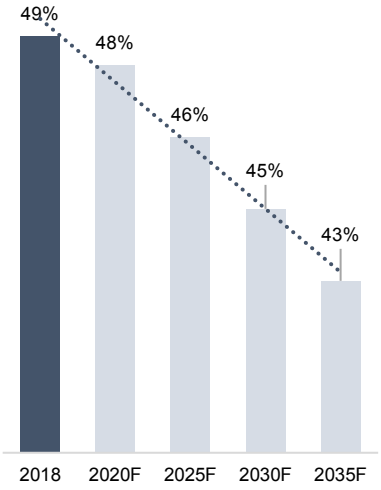
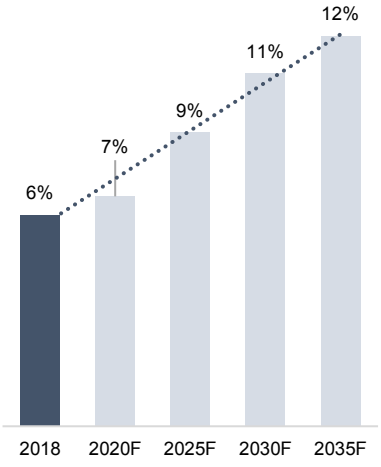


Exhibit 36: UK RR



carbon emissions by 37.50%, from 2021 to 2030. The 2021 target demands an EU fleet-wide average of 95g of CO_2/km (-27% from the previous target). Players such as VW have been struggling to meet these marks, which made its market share decrease from 20% to 18% in Q4 2018. On the other hand, BMW is at the forefront of electrification, ahead of both VW, Daimler and Tesla. **BMW is the leader in electromobility market share in Germany**, with a 21% figure, followed by Tesla (11%) and Renault (11%). Both VW (8%) and Mercedes (5%) lag behind. As Germany prepares to ban the sale of new diesel cars by 2030, this will be crucial for the Group to preserve its position. Note that, even though we are optimistic regarding the future of BMW under an electrification shift, as new players enter the premium EV market, we see the scenario of a preservation in market share more likely than an increasing market share, being this the reason why we opted for a growth rate of almost zero.

United Kingdom: Despite BMW's acquisition of Rolls-Royce dating back to 1998, followed by MINI's in 2000, the UK only started to be regarded as a primary market in 2014, accounting for 9.68% of the Group's total deliveries. Ever since 2014, the change in weight of the UK in BMW's total deliveries was minor, it being a mature market for the Group. Nevertheless, it was the only geography keeping its weight in total deliveries even after the strong breakthrough of China. **From 2014 to 2018, BMW's sales in the UK rose at a CAGR of 3.05%, a strong positive figure given that the overall market presented a negative CAGR of -0.41%, during the same time span.** In our model, once analysing the UK's population growth prospect, the RCP, RR and BMW's market share evolution, we forecast a **CAGR of 4.52% for BMW's deliveries in the region from 2019 to 2035.**

The UK's RCP grew from 46.8% in 2008 to a current value of 48.8%, though not as much as in Germany and not as low as in the US. In the UK, the usage of e-hailing alternatives has been a reality for almost as long as in the US, despite a slower adoption. Thus, we expect the country to decrease its RCP towards US values, given both new customer mobility preferences and environmental friendliness of car-sharing. Likewise, by **2035 we expect RCP to be 43.0%.** Once again, as a sharing-economy on the mobility spectrum implies a higher **RR, we expect this figure to go from 6.4% in 2018 to 11.9% in 2035,** still lower than in the US.

As for BMW's market share in this geography, we believe the Group is well-positioned to preserve its circa 10% market share. Currently, BMW ranks third in the market, right after Daimler and the market-leader US automaker, Ford. Amid these figures and a surge in population growth, we arrive at the aforementioned **CAGR for deliveries in the UK of 4.52% during the forecasted period.**

Exhibit 37: UK Market Share

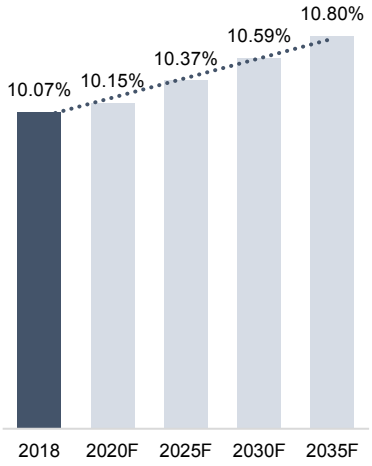


Exhibit 38: US RCP

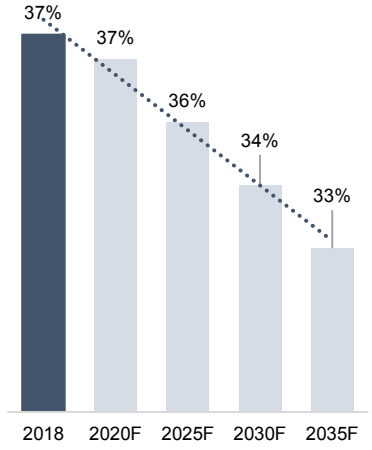
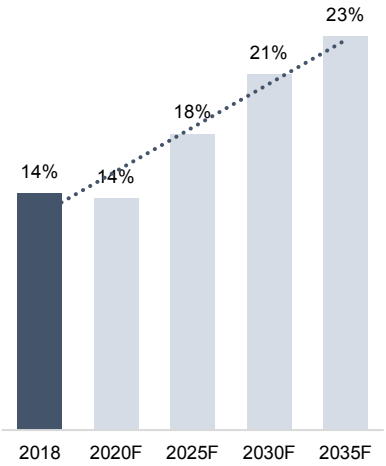


Exhibit 39: US RR



United States: The US is the second-largest market for the BMW Group, with a weight of 14.29% in total deliveries, in 2018. From 2008 to 2018, BMW sales grew at a CAGR of 1.46% in America, having successfully penetrated the market. Similarly to Germany, the weight of US deliveries decreased ever since 2008 (18.82%) - as the presence of China in the Group's figures was inevitable. Even though the US is the geography we are less optimistic in what concerns market share, our model still predicts a **CAGR of 2.26% in the forecasted period for the Group's deliveries.** An increasing population at an above-average rate and a quickly rising RR are the major drivers that lead us to believe the **US car market will grow at 2.87% CAGR in the forecast period**.

When analysing the US car market, looking at the evolution of its RCP and RR, one can encounter the most developed geography in what regards the mobility of the future. **America has the lowest RCP of all the primary developed economies BMW operates in**, with only 37.3%. Plus, it also has the highest value of RR (14.1%). Such combination indicates e-hailing and car-sharing are a reality in the country for a long-time. Services such as Uber, were easily adopted in the US and therefore its car industry evolved at a fast pace. Likewise, we expect America's RCP to decrease at a smaller rate than it did in the past three years. This results in an **RCP forecast of 33.2% by 2035.**

As for the RR, it has gone from 10% to a current 14% value - a massive upward trend. Given that a shared-car's RR is six times more than that of a regular vehicle, we estimate that the **US RR will reach 23.5% by 2035.** For this reason, and a population CAGR of 0.59% (2008-2018 CAGR: 0.20%), the US car market is expected to grow at the aforementioned 2.87%. For BMW in particular, amid a decreasing market share of 1 bps per year until 2035, **the CAGR is lower (1.95%).**

With additional competition on the EV premium segment from US firms and higher protectionist measures, we believe the Group's market share is deemed to decrease at a slow rate. BMW ranks fifteenth in what regards market share on the US (2.06%), right after VW (2.05%) and Mercedes (2.02%). Nonetheless, Tesla's sprint is notable. It currently holds a 1.15% slice of the market, which corresponds to a YTD change of 294.51%. Having said this, our model reflects that by 2035 **BMW's market share in the US market will correspond to 1.85%.**

China: The Chinese market is by far the leading market for BMW since 2013. By the end of 2018, about one-fourth of the Group's deliveries were respective to China (4.59% in 2008). Between 2008 and 2018, the **Chinese car market grew at a CAGR of 12.66%**. Yet, **BMW was capable of doubling this figure by growing its Chinese deliveries at a CAGR of 22.97%.**

One of the major drivers of this success was the creation of **BMW Brilliance Automotive Ltd.** (BMW Brilliance), a joint venture between the BMW Group and

Exhibit 40: US Market Share

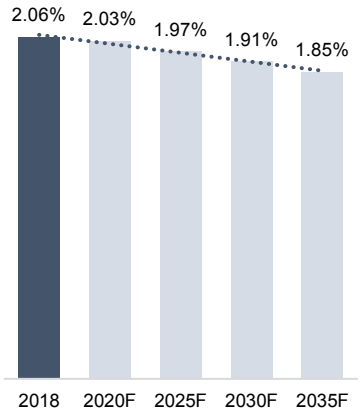


Exhibit 41: China RCP

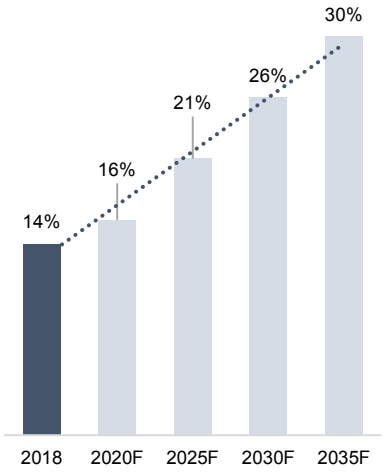
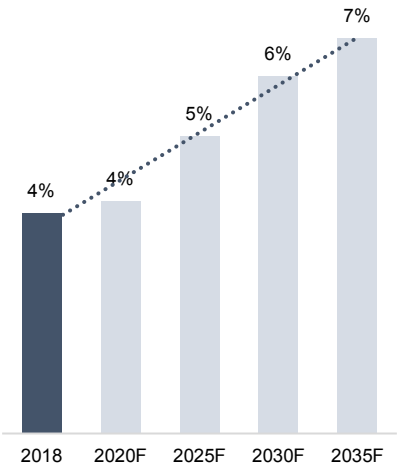


Exhibit 42: China RR



Brilliance China Automotive Holding Ltd. (CBA). This partnership started as early as March 2003, with the aim of producing BMW brand vehicles for the Chinese market. By October 2003 the first Chinese-made BMW was already being sold. Initially, both parties began by holding each 50% of the joint venture, yet **BMW will buy an additional 25% for 3.60 billion EUR, in 2022 - making the Group the first foreign carmaker to take control of its joint venture company in China.** This transaction will entail BMW Brilliance to be fully consolidated into the Group's financial statements, thus adding value to the company. Additionally, this deal will help BMW lessen the impact of higher tariffs imposed by the current trade war, as it now plans to boost manufacturing capacity in China and expand local production of models including EVs. It also counters the potential exposure to possible Chinese retaliation against German automakers amid Huawei's 5G exclusion as a supplier of 5G wireless equipment in the country. Such a competitive advantage is not held by Daimler, BMW's major European competitor in the Chinese market - both firms hold approximately 2% market share in the region. Likewise, we are optimistic of BMW's capabilities to continue to leverage growth opportunities in the premium and luxury car market in China, with reduced concern over possible implications from trade disputes. Our model estimates the **Chinese auto market to grow at a CAGR of 3.77%**. We expect **BMW to outperform the market with a CAGR of 4.42%.** Moreover, we expect **China to represent a larger slice of the Group's deliveries, 42.14%** by 2035. Such values rely on our analysis of the Chinese population evolution, RCP, RR and BMW's market share forecast.

When considering the RCP in China, one must consider that the country holds the lowest value from all the primary regions of BMW (14.4% in 2018). Such a low number is justified by it not being such a mature market in what regards mobility. For example, second-hand car markets are relatively recent in the country. Despite, China's ease to adapt its infrastructure to accommodate shared mobility, we believe the country will keep on lagging behind developed markets in terms of RCP and will converge more rapidly to a car-shared mobility spectrum. Thus, we forecast an **RCP figure of 30.1% by 2035**, about 3% lower than the forecasted value for the US (RCP: 33.2%).

In 2008, a figure close to zero upheld for the Chinese RR. It is, therefore, the primary region for BMW with the highest growth for this ratio. Given the assumptions considered for the **RR development upon car-sharing prospects we arrive at a figure of 6.6% for 2035.**

As the Chinese market matures and approaches markets such as the US, alongside existing car ownership and stage of highway infrastructure, we believe the potential for car sales to be robust. According to McKinsey, there is a stated consumer preference in China towards trading up vehicles. This is a positive indicator for the continuity of sales growth in the region. Moreover, the Chinese passenger-car market is becoming

Exhibit 43: China Market Share

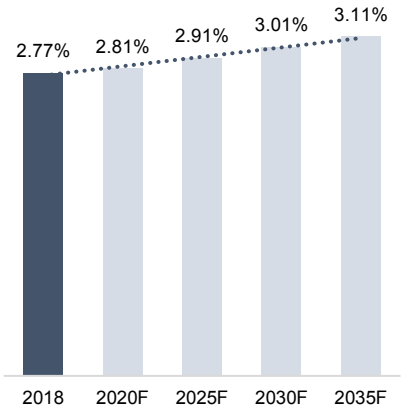


Exhibit 44: China Population

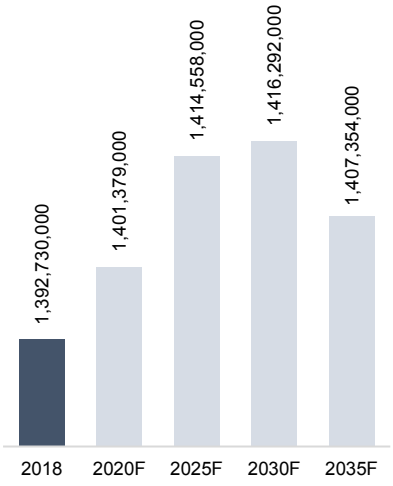


Exhibit 45: Daimler's Financials

Daimler	2014	2015	2016	2017	2018
Sales (k)	1,722	2,001	2,238	2,373	2,382
Revenues	73,584	83,809	89,284	94,351	93,103
EBIT	5,853	7,926	8,112	8,843	7,216
EBIT Margin	8.00%	9.50%	9.10%	9.40%	7.80%
SP	68.97	77.58	70.72	70.80	45.91

Source: Daimler AG Financial Report 2018.
Values with respect to automotive segment

increasingly concentrated as customers develop deeper loyalty to brands. Leading brands are taking nearly 80% market share, as it is moving towards consolidation. Studies confirm Chinese consumers tend to have only up to two to three brands in mind when setting out to buy a car. As the **proportion of new buyers is declining** attracting and maintaining the loyalty of existing car owners is becoming increasingly important. This can be an edge for BMW, since German, American, Japanese and British brands are perceived as providing high quality, safety, luxury, comfort and outstanding performance. As these brands dominate the high-end segment, we expect BMW to keep increasing its **market share, yet at the slower pace of 0.02% (0.2% YoY historical average), reaching 3.11% market share by 2035 (2018: 2.77%).**

It is important to highlight the role of Rolls-Royce in the Group's presence in China. The Chinese luxury car market grew 7% in 2018, and **Rolls-Royce was one of the preferred brands.** As previously mentioned, China became Rolls-Royce second-largest market and is expected to rise to number. The brand's top luxury vehicles are gaining favour amongst ultra-high-net-worth Chinese customers, who are willing to pay for the extra personalisation options and comfort.

Comparable Companies

Before moving on to the BMW Group's valuation, it is important to analyse the financial health of its most direct peers, Daimler and Audi. These big premium German carmakers fight locally and globally to gain market share and increase revenues. Thus, with very similar business units and structures, analysing these companies gives an overall picture of how the market is looking at premium cars.

a. Daimler

Both companies have faced **recent major management and leadership changes**, Daimler with the retirement of Dieter Zetsche, CEO for 13 years and BMW with its recent change of CEO. However, good things can come from uncertainty. Many expect that a change in leadership may lead to a reset of the companies and consequently to **electrification initiatives.** EVs high production costs are not completely covered by the price premium, which makes margins lower, and investors less optimistic. Additionally, both BMW and Daimler are obliged to take up significant development costs to expand EV production (BMW invested 1.4 billion EUR in 2018). From 2017 to 2018, BMW's automotive profit before tax decreased by 20%, while Daimler's decreased by 24%.

Regardless, Daimler's sales grew the most between the three premium German players, for the past five years. Since 2015, Mercedes-Benz cars deliveries grew at a higher rate than BMW brand's sales. Despite the increase in deliveries, Daimler cars division **experienced a decrease of -1% in revenues in 2018, which was not felt by BMW.**

Exhibit 46: BMW vs. Daimler 2018 Share Prices

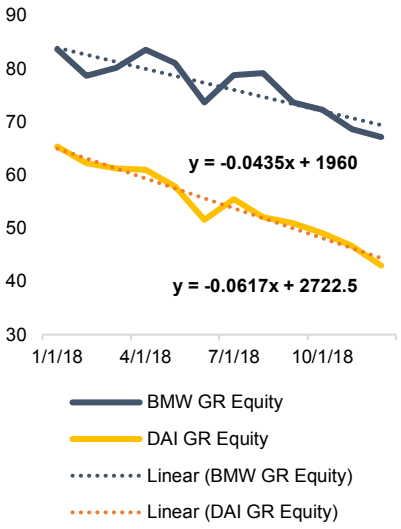
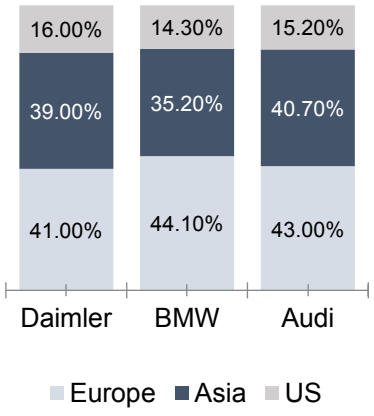


Exhibit 47: Audi's Financials

Audi + Porsche	2014	2015	2016	2017	2018
Sales (k)	1,741	1,803	1,867	1,878	1,812
Revenues	53,787	58,420	59,317	59,789	59,248
EBIT	5,150	5,134	4,846	5,058	4,705
EBIT Margin	9.60%	8.80%	8.20%	8.50%	7.90%

Source: Volkswagen group Financial Report 2018.
Values with respect to automotive segment

Exhibit 48: Vehicle deliveries per region - 2018



This can be explained by the Group's effort to launch numerous new vehicle models, both electrified and combustion, while Mercedes holds a far smaller product offer. **BMW was the only German premium carmaker to counter the downturn in demand in China and the US**, with increased deliveries in these regions. However, Daimler has had an EBIT margin 0.2% above that of BMW for the past three years.

Daimler's **share price** has suffered more dramatically than BMW's, with the closing **price in December 2018 dropping by more than a third** when compared to 2017 (2018: 45.91 EUR, 2017: 70.80 EUR, -35%). This accentuated drop is due to the leadership uncertainty mentioned above and the two-profit warnings, that resulted from increased expenses to comply to EU emission regulations, increased provisions to replace AC systems in old vehicles and trade war conflicts.

b. Audi

The Audi brand belongs to the Volkswagen Group, but it is still perceived as a premium car manufacturer. Audi is the brand with the fewer sales and revenues of the three and also the one with the least capacity to capitalize on sales (smaller average revenue per car delivered). However, its EBIT margin (7.9%) is slightly higher than that of BMW (7.20%) and Daimler (7.80%). The firm's investment in a common engineering platform (MQB) allows for the production of several standardized car models. **These platforms, adopted by all the major group brands, provide increased flexibility and reduced production costs.** Meanwhile, VW is demonstrating a strong commitment to EVs by investing in the Modular electric drive matrix (MEB) which is the EV equivalent of MQB. This is the firm's biggest hope on making superior profits on these cars. The MEB focuses exclusively on the production of fully electric vehicles. This contrasts with BMW's decision to keep producing both fully electric and hybrid plug-in autos. The MEB is already bringing significant cost advantages to the VW Group in what regards battery price. In 2019, a company source stated that **VW is buying batteries at less than the threshold for EV mass adoption (100€/kWh)** - not officially confirmed. If true, this could be a significant threat to BMW's EV leadership.

c. Overall

Regarding the geographical distribution of sales, the three automakers have a similar weight of unit sales per geography. **The European market is still the largest buyer of German premium cars but may soon be surpassed by Asia, which is gradually gaining importance. Meanwhile, the US market, most mature, is gradually losing weight.**

In terms of profitability indicators, it can be noted that BMW is more efficient in using its assets to generate earnings, than its main competitor, Daimler. However, its ROA is still

Exhibit 49: Comparable Companies' Financials

Indicator	BMW	Daimler	VW	Median
ROA	2,3%	1,4%	3,0%	3,0%
ROE	8,7%	6,4%	12,9%	12,9%
ROIC	2,8%	2,1%	3,3%	3,0%
WACC	3,0%	2,6%	3,6%	3,6%
Debt/EBITDA	8,5	12,5	5,0	8,5
EBIT Margin	9,3%	6,1%	5,9%	5,9%
FCF	-2862	-7191	-	-
Gross Margin	19,0%	19,8%	19,7%	19,0%
Operating Margin	9,3%	6,1%	5,9%	5,9%

Source: Bloomberg

Exhibit 50: Sales per Brand ($M)

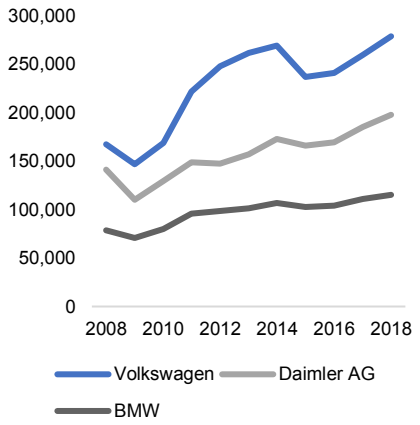
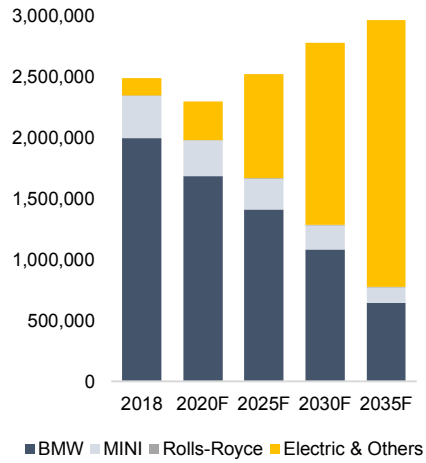


Exhibit 51: Number of Units Sold per Brand (Forecasts)



far from the peer's median. BMW's ROE and ROIC are also larger than Daimler's, which means that **BMW has allocated its capital to more profitable investment opportunities**. Nonetheless, the company is still much below the industry average of 12.93% and 3.03%, respectively.

Despite having a smaller gross margin, meaning it utilises more direct resources to produce the same amount of sales, it has a much higher operating margin. The Group seems to be **more efficient with respect to fixed costs**, which overcompensates its higher variable ones. Thus, the company can generate more profit from a unit of sales than competitors. This profitability advantage is maintained after depreciation and amortization. In Exhibit 49, one can see that **BMW's EBIT margin is much above that of its comparable companies.**

In Exhibit 50, it is perceptible that the Group has constantly had lower revenues than Daimler. Yet, note that these figures consider not only the automotive segment. However, there is a **steady growth of revenues for BMW,** which is not true for the others. Additionally, the big German automakers have a serious issue of being overly leveraged. **BMW's debt out-weights its equity by 150x,** while the automotive industry average **D/E** ratio is 2.5x. Such a leveraged position can be dangerous in case of an abrupt fall in the sales level which would make it hard for BMW to service its debt. Regarding the **WACC**, one can note that **BMW is being discounted at a lower rate than the peer average.** This implies that the market associates a lower risk to the company due to its low cost of financing and capital acquisition - **A credit rating** firm.

Valuation

Given the company's strategy, market trends' and peers' outlook, the BMW Group can be valued. In order to do so, key captions are forecasted based on **relevant value drivers, which are mainly related to revenue.** To estimate BMW's value, we used the Discounted Cash Flows (DCF) method, since, regardless of its limitations, this method reflects the main value drivers. The forecast[19] was conducted until 2035 and from that year onwards a perpetual nominal growth of 1% was assumed, based on the inflation rate.

a. Revenue Forecast

Automotive: The forecast of the Income Statement and Balance Sheet were mainly based on revenues since many of the captions were calculated depending on them.

[19] The firm's financial statements were reformulated in core and non-core operations. The Automotive and Motorcycle segments were considered the true core operations. The Financial Services and Other Entities were considered non-core.

Exhibit 52: Germany - Number of Units Sold per Brand (Forecasts)

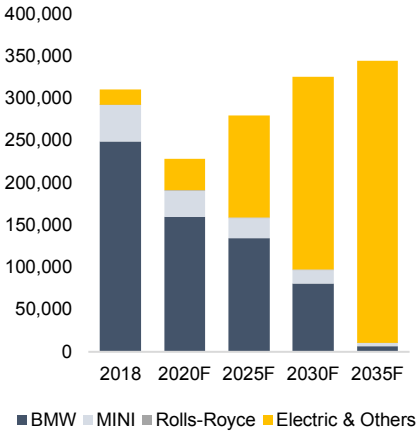


Exhibit 53: UK - Number of Units Sold per Brand (Forecasts)

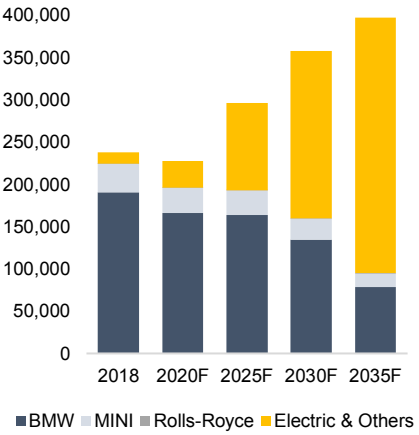
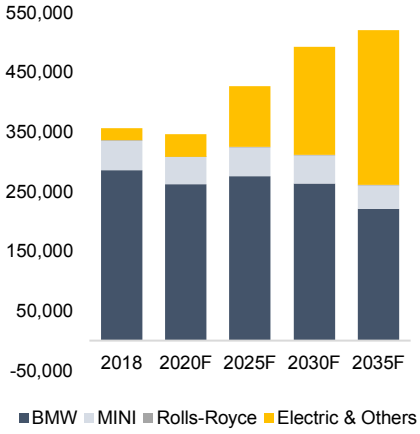


Exhibit 54: US - Number of Units Sold per Brand (Forecasts)



Hence, to forecast sales a top-down approach was adopted where each geographical region and brand were analysed separately. The goal was to have a picture of the Group's **total deliveries per geography**. Meanwhile, to further understand the impact of each brand on the price-mix, the average revenue per car was adjusted since Rolls-Royce, BMW, MINI, and EVs have distinct market prices.

For each major geographical area, Germany (12.50%), UK (9.60%), USA (14.30%) and China (25.70%), BMW's total deliveries were forecasted based on each country's population, passenger vehicles in use, new car registrations and BMW's market share in the region. Namely, the future number of new car registrations was forecasted attending to the population, RCP and RR. Based on these, a conservative sales momentum was predicted for the Group's automobile brands. By 2035, the company is expected to reach a revenue level of **97,422 million EUR**. This implies a **CAGR of 2.24%** for the next 17 years, which entails a slowdown in revenue growth when compared to the last eleven years (CAGR of 5.60%). We would like to stress that the company is well-positioned to capture revenue from the future trends mentioned before in the report, hence maintaining its market share in the most important markets. Nonetheless, the main contributor to revenue growth will continue to be the **Chinese market, whose deliveries are expected to represent 42.14%** of total deliveries by 2035 (25.73% in 2018).

Based on the market price of IC BMW, MINI, and Rolls-Royce vehicles, and the respective non-IC versions, a weighted average of price is calculated considering their contribution to total deliveries. The computed price will be further influenced by the inflation rate (1%). Meanwhile, EVs will continue to gain relevance among passenger vehicles. Despite the expected decrease in their average price - due to increased competition and reduced materials costs - it is foreseen that these vehicles will continue to be more expensive than their IC counterparts. At the same time, we expect that the incorporation of autonomous features will have a small influence on the price-mix - the material costs related to radars and other components are already decreasing substantially in price. Consequently, the BMW Group is more likely to charge a slightly higher average price per vehicle **predicted at 41,033 EUR for 2035** (34,467 EUR in 2018), **which reflects a CAGR of 0.67%.**

Meanwhile, the final deliveries per region were calculated by multiplying BMW's market share by the estimated number of new car registrations. Note that the number of new car registrations equals the total new cars sold per year. As previously mentioned, the **RCP** will gradually decrease, as people will have a lesser need to own a car, while the **RR** will gradually increase. Despite the decrease in RCP, the number of passenger cars, in total, will continue to rise as the population increases. At the same time, the increase in RR will contribute to a higher number of new registrations per year, which favours the Group's increase in sales. Likewise, **BMW's deliveries for 2035 are expected to equal**

Exhibit 55: China - Number of Units Sold per Brand (Forecasts)

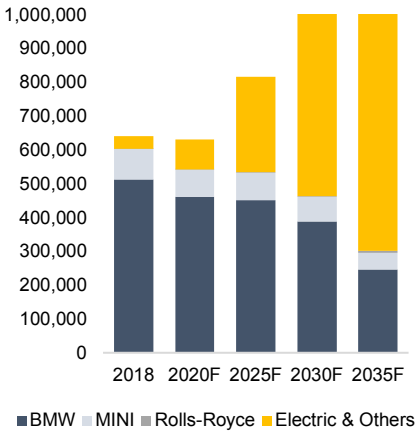


Exhibit 56: Number of Motorcycles sold (forecasts)

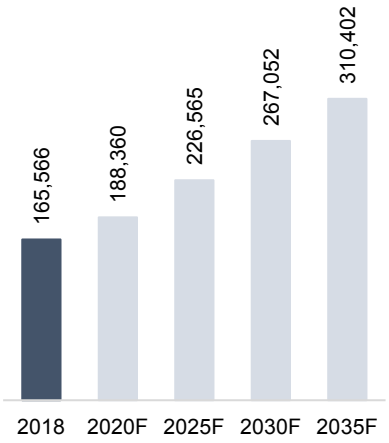
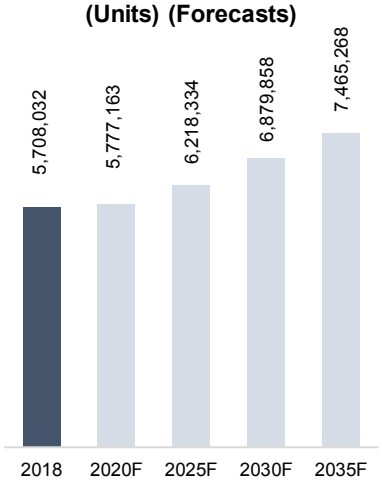


Exhibit 57: Financial Services Contract Portfolio (Units) (Forecasts)



2,967,820 automobiles, which mirrors a positive trend (2018: 2,490,664; CAGR of 1.56%).

Motorcycles: The forecast for motorcycle sales was performed considering three main geographical areas, Germany (14.40%), Italy (8.50%) and the US (8.40%). Similarly to the automotive segment, the Group's total deliveries were forecasted based on the **country's population, motorcycles in use, new motorcycle registrations and BMW's market share.** The future number of new motorcycles' registrations was forecasted attending to the estimated population, RCP and RR. Regarding the RCP, the main markets have experienced a minor increase in the number of motorcycles per population, with the exception of the US. Meanwhile, there is a broadly spread increase in RR, felt more intensively in the US (+8.00% from 2016 to 2018). The increase in RR and population offsets the lower RCP, which leads to an increase in the sales of motorcycles. However, BMW is losing ground in the US and Italian markets, only increasing its market share in Germany. Given this, motorcycle revenues are expected to reach **4,821 million EUR** by 2035, which showcases a **CAGR of 4.19%** for the next 17 years, lower than the CAGR for the past 11 years (5.39%).

Financial Services: Financial Services revenues were forecasted based on the **number of contracts and return per contract.** As the segment's main revenue source is financing and leasing of autos and motos, the number of new contracts was calculated based on the units sold each year and the penetration rate of the its products. For a penetration rate of **70.73%,** it is expected that by 2035, this segment will have a revenue of **40,789 million EUR,** which has an implicit **CAGR of 2.52%** (5.95% for the past 11 years).

b. Gross Margin Projection

As previously mentioned, carmakers in general, are suffering from gross margin shrinkage. The higher cost of production of EVs and AVs, and the costs of adaptation to new environmental laws, lead to a decrease in profitability. BMW's automotive segment COGS represented 79.06% of revenues in 2018, translating into a gross margin of 20.94%. **The COGS is expected to equal 81.69% of revenues from 2019 onwards - gross margin of 18.31%.**

Improvements need to be undertaken so that EV models become as profitable as its IC peers. According to McKinsey, an EV costs, on average, 12,000 USD more to produce than an IC vehicle, batteries being the most expensive component. In 2015, batteries cost around 7,500 USD (373 USD/kWh). Yet batteries' costs have already decreased to 176 USD/kWh[20], in 2018, which represents a 50% decrease in production costs. Elon

[20] According to Bloomberg: "A Behind the Scenes Take on Lithium-ion Battery Prices"

Exhibit 58: Gross Margin (%) (Forecasts)

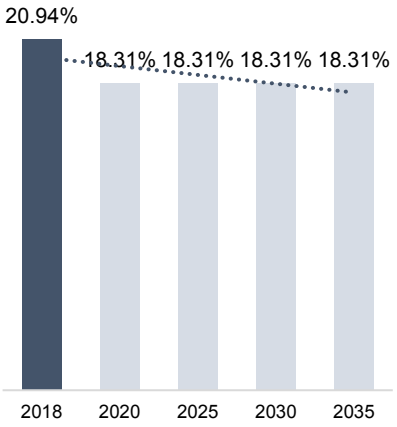


Exhibit 59: EVs Batteries Prices (USD/kWh)

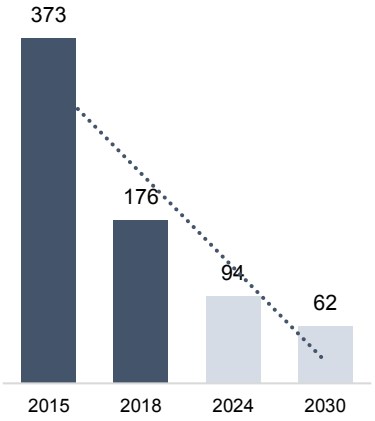
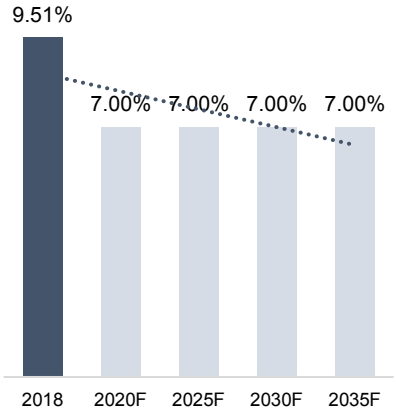


Exhibit 60: Automotive EBIT Margin (%) (Forecasts)



Musk, stated in June 2018, that Tesla's batteries were close to reaching the cost of 100 USD/kWh. This price has been mentioned as the threshold towards mass adoption of EVs. However, it was VW that, in September 2019, managed to push battery costs below this value by taking advantage of economies of scale[21]. If demand for lithium batteries continues to increase, Bloomberg expects a 94 USD/kWh price by 2024 and **62 USD/kWh by 2030** (for a learning rate of 18%). This will allow carmakers to charge more affordable prices for EV while getting higher margins. As previously stated, this was the major rationale for our belief that EVs would converge towards the price of IC vehicles.

Most of AVs are produced using LiDAR radars. A LiDAR radar's price stands at 75,000 USD, yet it is expected to cost approximately **2,000 USD by 2030.**[22] The decrease in costs is mainly explained by the increase in demand that will allow certain providers to reach economies of scale. Moreover, if there is a breakthrough discovery that allows for LiDAR sensors with solid-state design, its price can go down to a couple of hundred dollars. However, sensors are not the only additional cost of AVs. These vehicles will require special software, wireless networks, navigations systems, automated controls and more frequent maintenance. Thus, even if the sensor's cost is expected to decrease significantly, autonomous cars will still have a higher cost of sales than current IC vehicles.

Concluding, vehicle electrification, autonomous elements, digital experience improvement, and design are some of the premium vehicle differentiators that BMW is investing in. This increase in the number of features leads to higher COGS. In normal conditions, these higher costs are offset by charging premium prices. However, we believe that BMW capability to increase prices further is compromised by recent customer expectations. Consumers expect their vehicles to include several features per se, without being willing to pay extra for them (e.g. GPS and AC). As mass-market vehicles include more of these "premium" features, premium carmakers need to come up with innovative add-ons to keep charging higher prices. This market trend will ultimately limit premium automakers' pricing power. Given this, we estimate a small decrease in **BMW's automobiles EBIT margin from 9.5% to 7%.**

Regarding **motorcycles, a gross margin of 20.57%** was estimated considering that the company has maintained this margin for the past ten years and we do not expect substantial changes. The **Financial Services gross margin** was calculated as an average of the past 11 years, including the financial crisis years to account for this possible scenario. Thus, we expect it to be in line with that of the past year and equal **14.03%** (13.96% in 2018).

[21] According to New York Times article: "Volkswagen Hopes Fresh Logo Signals an Emission-Free Future".
[22] According to UBS autonomous report and Forbes, "How soon and How much?" article.

c. Discounted Cash Flow

Exhibit 61: WACC Calculation Inputs

BMW Beta (5 Years)	1,21
Risk-Free Rate	0,77%
MRP	5,72%
Re (Cost of Equity)	7,67%
Rd (Cost of Debt)	0,80%
Equity Value	48,00
Net Debt	101,00
EV	149,00
Debt to Equity	2,10
Statutory Tax Rate	31,00%
WACC	**2,84%**

Exhibit 62: DCF Valuation Output

DCF Valuation	
WACC	2,84%
Growth	1,0%
Enterprise Value	159 206
Net Debt	-102 974
Equity Value	56 232
Shares Outstanding (M)	658
Price Target FY2020	**85,51**
Price Today	**74,20**
Upside	***15,24%***

WACC Estimation: For the purpose of the DCF valuation, a **single WACC discount rate** was considered, amid BMW's goal to maintain an A credit rating. We believe BMW's capital structure to remain constant as there is no evidence of major changes to occur in the forecasted period. The Group's debt corresponds to 67.79%, while equity amounts to 32.21% of the enterprise value. Exhibit 61 showcases the considered inputs. As previously mentioned, BMW's shareholder structure is mostly composed of EU (58.4%) and US (35.5%) investors[23]. Therefore, in order to mirror the Group's investor pool both geographies' benchmarks were considered and weighted accordingly. The proxy used for the EU risk-free rate was the 10-year German Bunds (-0.20%) whilst for the US, the US Treasuries (2.12%) were considered. Once weighted, a **final risk-free of 0.77%** was obtained. The DAX[24] and the S&P 500 were the indexes considered for the beta computation. BMW's share price returns 82.37% correlation with the DAX, the highest when compared to any other index, and a 50.28% correlation with the S&P 500. In order to attain the firm's beta a 5-year monthly window[25] was used, resulting in **1.21.** This reflects the cyclicality associated with autos. For the **market risk premium calculation,** the monthly German Bunds were subtracted to the monthly DAX returns and averaged. The same process was conducted for the US benchmarks, resulting in an **MRP of 5.72%[26].** From that, a **cost of equity of 7.67%** was computed using the CAPM. To determine the company's cost of debt, the mid-YTM of an outstanding bond maturing in 2029 was used (0.62%). Given the bond's liquidity, years to maturity, and high credit rating we perceived its mid-YTM as fully representative of the Group's cost of debt[27]. Lastly, given a statutory tax rate of 30.80% and BMW's capital structure, a final **WACC of 2.84% was attained.** Our WACC estimation follows the market's expectations yet being slightly higher[28].

Outcome: Since BMW's ROIC and growth of unlevered cash flows have been constant in the past years, we applied a 17-year forecast horizon for all the necessary input factors. The free cash flows obtained were afterwards used to estimate the company's enterprise value. Likewise, our DCF leads to a **BUY** recommendation for BMW's Group potential investors at a **target share price of 85.51**, which represents a **15.24% upside** to the current share price of 74.20[29]. Having 658 million shares outstanding, such results in an

[23] The total weight of American investors was 41.6%, including Asian investors (4.8%) and the Rest of the World (1.3%).
[24] Consists of the 30 major German companies trading of the Frankfurt stock exchange.
[25] The approach followed is the one recommended by the EY Switzerland "Valuation Best Practices".
[26] Similar to 5.50% values suggested in the literature.
[27] According to the McKinsey Valuation book, for a company with an investment-grade bond, the YTM is a suitable proxy of the cost of debt.
[28] Analysts at Bloomberg presented a WACC for BMW of 2.70% as of Q2 2019.
[29] Source: Bloomberg.

Exhibit 63: Scenario Analysis of Share Price to Chinese RCP and market share evolution

Scenarios	Share Price	Probability	Weighted Share Price
Pessimistic	59,56 €	15%	8,93 €
Base	85,51 €	60%	51,31 €
Optimistic	104,88 €	25%	26,22 €
Share price			86,46 €

equity value of 56,232 million EUR and an estimated **enterprise value of 159,206 million EUR**. Lastly, once considering our estimated value for the WACC (2.84%) and long-term nominal growth rate (1%), the **discounted terminal value computed is of 122,314 million EUR**, which represents **76.83%** of the total company value, while the discounted operations correspond to **23.17%** (36,892 million EUR).

d. Scenario Analysis

As previously detailed in the report, we expect the breakthrough from China to continue to present attractive growth opportunities and to increase BMW's dependence on this market. In order to quantify the possible risks of a slower increase in the Chinese car market or a smaller market share capture, we decided to identify three main scenarios. These three different scenarios are the following: base scenario, worst-case and best-case. The base-scenario is the one assumed throughout the report and the most likely to happen (60% likelihood). In this scenario, the Chinese car market and BMW's market share are expected to continue to increase, but at a slower pace[30] - market share will surge at one-tenth of the average of the last three years. In the worst-case scenario (15% likelihood) the Chinese car market would increase at a slower rate due to a smaller increase of the RCP – e.g. if customers begin to choose mobility services over a personal car sooner than expected. BMW's market share evolution could also be below expectations – e.g. if the Group is more affected by trade wars than we perceive. Nevertheless, we still believe the automaker market share will increase given BMW Brilliance inner-country production. With these assumptions holding, a share price of **59.56 EUR** is obtained, translating into a **20.11% downside**. Such would result in a SELL recommendation instead. Lastly, on the best-case scenario (25% likelihood) an increased growth in the Chinese car market and BMW's market share was predicted. This could happen if there is a faster concentration of the industry and BMW continues to emerge as a preferred EU premium car brand. These assumptions result in a share price of **104.88 EUR**, entailing an upside of **40.69%**, which reinforces our BUY proposition.

Exhibit 64: Sensitivity Analysis of Share Price to the WACC and g

WACC \ LT Growth rate	**85,51**	0,8%	0,9%	**1,0%**	1,1%	1,2%
	2,54%	106,3	118,8	133,0	149,1	167,6
	2,74%	78,9	88,7	99,5	111,7	125,4
	2,84%	67,3	75,9	**85,5**	96,2	108,2
	2,94%	56,7	64,4	72,9	82,4	92,9
	3,14%	38,3	44,5	51,4	58,9	67,1

e. Sensitivity Analysis

To test our model a sensitivity analysis of the price relative to several variables was conducted. Starting with both the WACC and the long-term growth rate, a sensitivity test with a 95% confidence interval was run. Note that these variables have a contrary effect on share price, with the WACC being the variable to which the price is more sensitive to. From our analysis, **BMW share price ranges from 38.27 to 167.64 EUR.** The lower

[30] Our model predicts that the Chinese car market will increase at a CAGR of 3.68% from 2019 to 2035, when compared to the last decade CAGR of 12.66%.

Exhibit 65: Sensitivity Analysis of Share Price to RCP

RCP	85,5 €	Germany	UK	USA	China
	1,0%	101,5	98,8	101,6	162,9
	0,5%	93,5	92,1	93,6	124,1
	0,0%	85,5	85,5	85,6	85,3
	-0,5%	77,5	78,8	77,5	46,4
	-1.0%	69,5	72,1	69,5	7,6

Exhibit 66: Sensitivity Analysis of Share Price to market share

Market share	85,5 €	Germany	UK	USA	China
	0,2%	89,3	88,1	103,0	93,21
	0,1%	87,4	86,8	94,3	89,37
	0,0%	85,4	85,5	85,7	85,53
	-0,1%	83,5	84,1	81,4	81,69
	-0,2%	81,6	82,8	77,1	77,85

Exhibit 67: Rolls-Royce Deliveries from China (Forecasts)

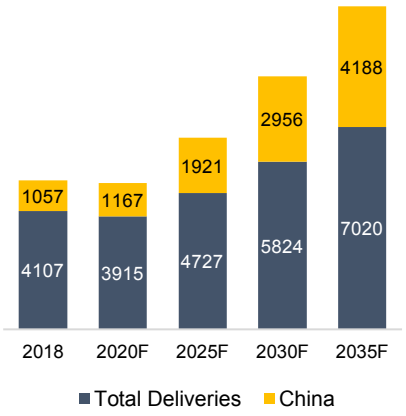


Exhibit 68: Comparable companies' list

Comparable Companies
Volkswagen AG
Daimler AG
Peugeot AG
Fiat Chrysler NV
General Motors Co.
Volvo AB

price would change our final recommendation to a SELL (downside: -48.67%). Nevertheless, as the majority of values do not change our final recommendation, we consider our model to be robust and within a reasonable range of values. For the WACC, amid a more dovish monetary policy from both the ECB and the Fed, we do not see such a scenario as likely, which brings additional confidence to our final recommendation.

Furthermore, in order to get the impact of the RCP and market share estimation per geography, these variables are also subject to sensitivity scrutiny. For both the RCP and market share, we use a 50-bps range. For the **primary geographies,** where the firm holds a mature position, a **change in market share has a higher impact on share price than a change in RCP**. Such is verified for both Germany and the US, but not China. A **higher RCP for China would have a larger impact on the share price than a market share gain**. As China holds a large population, a small change in RCP translates into a significative increase in the number of new car registrations. For this reason, even if the market share does not grow as much, the increased car market overcompensates.

When looking at the RCP's sensitivity analysis, our recommendation would change to a SELL within the extreme lower bounds, which is very unlikely. It would require urban areas to change drastically their infrastructure to accommodate for a much higher share of e-hailing services and car automation. We do not see this as a viable possibility for the near future. Especially for China, a decreasing RCP is unlikely as it is not a mature market. Currently, the RCP in China is 13% when compared to the most developed mature region regarding mobility, the US (37%).

Lastly, regarding market share, when looking at the lower bounds for all geographies, our final recommendation would change to a HOLD in case BMW's market share in China would decrease 18 bps every year until 2035. Also, in case such would happen in the US. Nevertheless, for such to take place in the US, the brand would have to cease sales in the region by 2035, which seems highly unlikely.

f. Multiples Valuation

Lastly, a relative valuation was performed to better understand the market perception of BMW. For this valuation, the chosen comparable companies were Volkswagen AG, Daimler AG, Peugeot AG, Fiat Chrysler Automobiles NV, General Motors Co. and Volvo AB. The criteria considered for the comparable list regarded the firm's size, profitability margins, business segments, geographical exposure and, credit rating profile. Thus, automakers such as Honda, Nissan and Tata Motors, were disregarded.

The multiples analysed were mainly the **EV/EBITDA** and the **Price-per-Earnings** ratio (P/E). The EV/EBITDA multiple is highly reliable since it does not consider the capital

Exhibit 69: Football Field

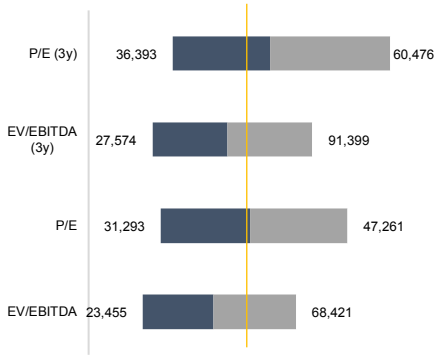


Exhibit 70: Final Share Price Estimation

Final Valuation	
DCF Price	85,51
Multiples Price	79,65
Weighted Final Price	**82,58**
Upside	***11,29%***
Dividend 2020	3,50
Total Return	***16,01%***

structure of comparable companies nor the susceptibility to accounting gimmicks. Generally, a high P/E ratio means that investors are anticipating higher growth in the future. Since investors are being pessimistic regarding long-term growth, the P/E ratio provided the most conservative valuation.

The average EV/EBITDA for the past three years is 3.0x. Likewise, the average EV/EBITDA of 2018 equals 2.9x. Considering BMW's EBITDA of 17,688 million EUR, and the average EV/EBITDA multiple of 3.0x, the implied enterprise value is **52,416 million EUR**. Regarding the P/E ratio, the average multiple for BMW's peers for the past 3 years is 7.9x, while the average P/E ratio of the same companies in the current year equals 6.3x. For a level of earnings of 7,115 million EUR and Net Debt of zero, the implied enterprise value obtained with the average **P/E ratio of 7.1x is 50,470 million EUR**. By considering both the EV/EBITDA and P/E ratio, BMW's implied enterprise value is **51,442 million EUR.** For a proxy of 658,122 million shares outstanding, the implied share price is of **78.17 EUR.**

In order to soften the fragilities associated with the DCF model, a **final price of 82.58**[31] was obtained by applying an equal-weighted average of the final prices from both valuation methods. Such reinforces our **BUY recommendation**, with a respective **upside of 11.29%.**

[31] We considered this price to be an equal weighted average (50%) of both valuation models, the DCF and multiples.

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Appendix

Income statement

in millions	2018A	2019E	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Core													
Automotive													
# of automobiles delivered	2 490	2 280	2 297	2 336	2 378	2 422	2 469	2 519	2 572	2 627	2 683	2 743	2 776
(units)	664	481	865	488	073	278	438	591	014	001	984	380	858
Average price per vehicle (€)	34 467	36 654	38 149	39 285	40 070	40 503	40 585	40 318	39 702	38 737	37 422	37 935	38 450
Revenues	68 947	66 871	70 128	73 432	76 231	78 487	80 178	81 269	81 691	81 409	80 353	83 257	85 416
Growth	*-2%*	*-3%*	*5%*	*5%*	*4%*	*3%*	*2%*	*1%*	*1%*	*0%*	*-1%*	*4%*	*3%*
Cost of Sales	-54 510	-54 629	-57 290	-59 989	-62 276	-64 119	-65 500	-66 391	-66 736	-66 506	-65 643	-68 016	-69 779
COGS (% Sales)	*79,06%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*	*82%*
SG&A	-7 880	-7 560	-7 928	-8 301	-8 618	-8 873	-9 064	-9 187	-9 235	-9 203	-9 084	-9 412	-9 656
SG&A (% Sales)	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*
EBIT	6 557	4 682	4 910	5 141	5 337	5 495	5 614	5 690	5 720	5 700	5 626	5 829	5 980
EBIT Margin	*10%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*	*7,0%*
Taxes	1 583	1 198	1 172	1 162	1 159	1 294	1 317	1 307	1 299	1 291	1 280	1 322	1 350
Effective Tax Rate	*24%*	*26%*	*24%*	*23%*	*22%*	*24%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*
Loss from discontinued operations	-33	0	0	0	0	0	0	0	0	0	0	0	0
NOPLAT	**4 941**	**3 484**	**3 738**	**3 979**	**4 179**	**4 202**	**4 297**	**4 383**	**4 420**	**4 409**	**4 346**	**4 507**	**4 630**
Motorcycles													
# of motorcycles delivered (units)	165 566	181 038	188 360	195 854	203 429	211 011	218 692	226 565	234 454	242 466	250 520	258 746	267 052
Average price per motorcycle (€)	13 125	13 256	13 388	13 522	13 658	13 794	13 932	14 071	14 212	14 354	14 498	14 643	14 789
Revenues	2 176	2 397	2 519	2 646	2 776	2 908	3 044	3 185	3 329	3 477	3 629	3 786	3 946
Cost of Sales	-1 741	-1 904	-2 001	-2 102	-2 205	-2 310	-2 418	-2 530	-2 644	-2 762	-2 882	-3 007	-3 134
COGS (% Sales)	*80%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*
SG&A	-263	-286	-300	-316	-331	-347	-363	-380	-397	-415	-433	-451	-471
SG&A (% Sales)	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*
EBIT	172	207	218	229	240	251	263	275	288	301	314	327	341
Taxes	-42	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*	*9%*
Effective Tax Rate	*24%*	-53	-52	-52	-52	-59	-62	-63	-65	-68	-71	-74	-77
NOPLAT	**130**	*26%*	*24%*	*23%*	*22%*	*24%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*

Financial Services													
	5 708	5 738	5 777	5 836	5 913	6 003	6 105	6 218	6 339	6 469	6 606	6 749	6 879
# contract portfolio	032	412	163	921	541	828	847	334	769	371	133	738	858
Revenue per contract	4 934	4 984	5 033	5 084	5 135	5 186	5 238	5 290	5 343	5 397	5 451	5 505	5 560
Revenues	26 355	26 739	27 189	27 745	28 390	29 112	29 903	30 758	31 672	32 643	33 666	34 742	35 766
Cost of Sales	-22 677	-22 986	-23 373	-23 851	-24 406	-25 026	-25 706	-26 441	-27 227	-28 062	-28 941	-29 866	-30 746
COGS (% Sales)	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*	*86%*
SG&A	-1 352	-1 408	-1 431	-1 461	-1 495	-1 533	-1 574	-1 619	-1 667	-1 718	-1 772	-1 829	-1 883
SG&A (% Sales)	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*
EBIT	2 326	2 345	2 385	2 433	2 490	2 553	2 623	2 698	2 778	2 863	2 953	3 047	3 137
Taxes	-716	-724	-737	-753	-772	-793	-816	-841	-868	-896	-926	-957	-987
Result	**1 610**	**1 622**	**1 648**	**1 680**	**1 718**	**1 760**	**1 806**	**1 856**	**1 910**	**1 967**	**2 027**	**2 090**	**2 150**
Other Non-Core Items													
Revenues	2	1	1	1	1	1	1	1	1	1	1	1	1
Cost of Sales	4	4	4	4	4	4	4	4	4	4	4	4	4
SG&A	-63	-24	-25	-26	-27	-28	-29	-29	-30	-30	-30	-31	-32
SG&A (% Total Sales)	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Other operating income and expenses	123	-181	-188	-195	-202	-208	-213	-217	-220	-221	-221	-229	-235
(% Total Sales)	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Result from equity accounted investments	632	630	650	658	681	698	715	735	754	774	795	815	837
(% Equity Investments)	*24%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*	*23%*
Interest Income	397	335	335	335	335	335	335	335	335	335	335	335	335
(%Other assets)	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*
Other Financial Results	51	51	51	51	51	51	51	51	51	51	51	51	51
(%Financial Assets)	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
EBIT	1 146	816	828	827	842	853	864	880	896	914	934	946	961
Taxes	-353	-252	-256	-256	-261	-265	-269	-274	-280	-286	-293	-297	-302
OCI	-604	183	183	183	183	183	183	183	183	183	183	183	183
Result	**793**	**564**	**572**	**571**	**581**	**588**	**595**	**606**	**616**	**628**	**641**	**649**	**658**
Financial													
Interest Expenses	-386	-464	-476	-489	-502	-515	-529	-543	-557	-572	-587	-603	-619
(%Financial Liabilities)	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Financial Result	**-386**	**-464**	**-476**	**-489**	**-502**	**-515**	**-529**	**-543**	**-557**	**-572**	**-587**	**-603**	**-619**
Tax Shield	119	143	147	151	156	160	165	169	174	179	184	189	195
Result	**-267**	**-321**	**-329**	**-337**	**-346**	**-355**	**-364**	**-374**	**-383**	**-393**	**-403**	**-414**	**-424**
Consolidated													
Sales	97 480	96 008	99 838	103 824	107 398	110 508	113 126	115 213	116 694	117 530	117 649	121 786	125 129
Cost of Sales	-78 924	-79 516	-82 661	-85 938	-88 882	-91 451	-93 620	-95 359	-96 604	-97 326	-97 463	-100 885	-103 656
SG&A	-9 558	-9 278	-9 685	-10 104	-10 471	-10 780	-11 030	-11 216	-11 329	-11 366	-11 319	-11 723	-12 041
Non-Core Income	1 203	836	848	849	864	876	888	904	920	939	959	972	987
Financial Income	-386	-464	-476	-489	-502	-515	-529	-543	-557	-572	-587	-603	-619
Taxes	-2 575	-2 084	-2 070	-2 072	-2 089	-2 251	-2 300	-2 317	-2 338	-2 362	-2 386	-2 461	-2 521
Income	7 240	5 503	5 794	6 070	6 319	6 387	6 535	6 683	6 786	6 843	6 853	7 086	7 279
Other comprehensive income	-604	183	183	183	183	183	183	183	183	183	183	183	183
Loss from discontinued operations	-33	0	0	0	0	0	0	0	0	0	0	0	0
Comprehensive Income	**6 603**	**5 685**	**5 977**	**6 252**	**6 501**	**6 569**	**6 718**	**6 866**	**6 968**	**7 026**	**7 036**	**7 269**	**7 461**

Taxes	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Statutory Rate Germany	30,8%	30,9%	30,9%	31,0%	31,0%	31,1%	31,1%	31,2%	31,2%	31,3%	31,3%	31,4%	31,5%
Reported Taxes	-2 575	-2 084	-2 070	-2 072	-2 089	-2 251	-2 300	-2 317	-2 338	-2 362	-2 386	-2 461	-2 521
Reported Tax (% EBIT)	*-26,2%*	*-27,5%*	*-26,3%*	*-25,5%*	*-24,8%*	*-26,1%*	*-26,0%*	*-25,7%*	*-25,6%*	*-25,7%*	*-25,8%*	*-25,8%*	*-25,7%*
Tax Shield	119	143	147	151	156	160	165	169	174	179	184	189	195
Non-Core Taxes	-1 069	-975	-993	-1 010	-1 034	-1 058	-1 085	-1 116	-1 148	-1 182	-1 218	-1 254	-1 289
Operation Taxes	-1 625	-1 251	-1 224	-1 214	-1 211	-1 353	-1 379	-1 370	-1 365	-1 359	-1 352	-1 396	-1 427
Operational Result Before Taxes	6 729	4 889	5 128	5 370	5 577	5 747	5 877	5 965	6 007	6 000	5 940	6 156	6 321
Effective Tax	**24%**	**26%**	**24%**	**23%**	**22%**	**24%**	**23%**	**23%**	**23%**	**23%**	**23%**	**23%**	**23%**

Balance Sheet

in millions	**2018**	**2019E**	**2020F**	**2021F**	**2022F**	**2023F**	**2024F**	**2025F**	**2026F**	**2027F**	**2028F**	**2029F**	**2030F**
Core Business													
Automotive													
Operating Cash	1 379	1 920	1 997	2 076	2 148	2 210	2 262	2 304	2 334	2 351	2 353	2 436	2 503
% of revenues	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
Inventories	12 462	12 342	12 943	13 553	14 070	14 486	14 798	15 000	15 078	15 025	14 831	15 367	15 765
Holding Period	*83*	*82*	*82*	*82*	*82*	*82*	*82*	*82*	*82*	*82*	*82*	*82*	*82*
Trade receivables	2 287	2 308	2 420	2 534	2 631	2 709	2 767	2 805	2 819	2 809	2 773	2 873	2 948
Collection Period	*12*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*
Trade payables	8 360	8 215	8 615	9 021	9 365	9 642	9 850	9 984	10 036	10 001	9 872	10 228	10 493
Payables period	*56*	*55*	*55*	*55*	*55*	*55*	*55*	*55*	*55*	*55*	*55*	*55*	*55*
Current tax	-315	538	552	584	603	623	636	645	648	646	637	660	677
Deferred tax	1 037												
Taxes (% EBIT)	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*	*11%*
Intangible assets	10 472	8 781	9 042	9 442	9 781	10 054	10 259	10 391	10 442	10 409	10 281	10 633	10 894
Intangible Assets (% Revenues)	*15,2%*	*13,1%*	*12,9%*	*12,9%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*	*12,8%*
Development Costs	9881	8 201	8 460	8 859	9 196	9 469	9 673	9 804	9 855	9 821	9 694	10 044	10 305
Intangible Assets (% Revenues)	*14,3%*	*12,3%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*	*12,1%*
Goodwill	33	33	33	33	33	33	33	33	33	33	33	33	33
Goodwill (# of transactions)													
Other Intangible assets	517	517	517	517	517	517	517	517	517	517	517	517	517
Other Intangible Assets (% Revenues)	*0,7%*	*0,8%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*
Brand-name right	41	30	32	33	35	35	36	37	37	38	38	39	40
Brand-right (%Net Profit)	*0,6%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*	*0,5%*
Property, plant and equipment	19 372	18 521	19 143	19 751	20 199	20 483	20 603	20 559	20 339	19 943	19 363	19 729	19 899
PP&E (%Revenues)	*28,1%*	*27,7%*	*27,3%*	*26,9%*	*26,5%*	*26,1%*	*25,7%*	*25,3%*	*24,9%*	*24,5%*	*24,1%*	*23,7%*	*23,3%*
Other provisions	10 799	10 546	11 060	11 581	12 023	12 378	12 645	12 817	12 884	12 839	12 673	13 131	13 471
Other provisions (% Op. Expenses)	*17,3%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*	*17,0%*
Invested Capital on Automotive	**27 535**	**25 649**	**26 422**	**27 339**	**28 044**	**28 544**	**28 830**	**28 901**	**28 740**	**28 342**	**27 693**	**28 339**	**28 722**
Motorcycle													
Operating Cash	43,52	47,95	50,39	52,92	55,51	58,16	60,88	63,70	66,58	69,55	72,58	75,71	78,92
% of revenues	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
Inventories	568	618	650	682	716	750	785	821	858	897	936	976	1 017
Holding Period	*119*	*118*	*118*	*118*	*118*	*118*	*118*	*118*	*118*	*118*	*118*	*118*	*118*
Trade receivables	167	173	182	191	201	210	220	230	241	252	263	274	286
Collection Period	*28*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*
Trade payables	348	370	389	409	429	449	470	492	514	537	560	585	609
Payables period	*73*	*71*	*71*	*71*	*71*	*71*	*71*	*71*	*71*	*71*	*71*	*71*	*71*
Deferred tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Intangible assets	95	73	76	80	84	88	92	97	101	106	110	115	120
Intangible Assets (% Revenues)	*4,4%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*	*3,0%*
Property, plant and equipment	399	425	446	469	492	515	539	564	590	616	643	670	699

PP&E (%Revenues)	*18,3%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*	*17,7%*
Other provisions	171	208	219	230	241	252	264	276	289	302	315	329	342
Other provisions (% Op. Expenses)	*8,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*	*9,5%*
Invested Capital on Motorcycle	**754**	**759**	**797**	**837**	**878**	**920**	**963**	**1 008**	**1 053**	**1 100**	**1 148**	**1 198**	**1 249**
Non-core Business													
Financial Services													
Operating Cash	527	535	544	555	568	582	598	615	633	653	673	695	715
% of revenues	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
Inventories	17	21	21	22	22	23	23	24	25	26	26	27	28
Holding Period	*0,27*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*	*0,33*
Trade receivables	91	149	151	155	158	162	167	171	176	182	188	194	199
Collection Period	*1*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Receivables from sales financing	86 783	89 375	92 045	94 794	97 626	100 542	103 545	106 638	109 823	113 104	116 482	119 962	123 545
Growth	*7,89%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*	*2,99%*
Trade payables	950	845	859	877	897	920	945	972	1 001	1 032	1 064	1 098	1 130
Payables period	*15*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*	*13*
Current tax	-129	-1 523	-1 549	-1 580	-1 617	-1 658	-1 703	-1 752	-1 804	-1 859	-1 918	-1 979	-2 037
Deferred tax	-1 258												
Deferred tax (% EBIT)	*59,6%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*	*64,9%*
Intangible assets	403	432	440	449	459	471	484	497	512	528	544	562	578
Intangible Assets (% Revenues)	*1,5%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*	*1,6%*
Development Costs	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodwill	347	347	347	347	347	347	347	347	347	347	347	347	347
Goodwill (# of transactions)													
Other Intangible assets	56	73	74	76	78	80	82	84	87	89	92	95	98
Other Intangible Assets (% Revenues)	*0,2%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*	*0,3%*
Property, plant and equipment	30	32	33	33	34	35	36	37	38	39	41	42	43
PP&E (%Revenues)	*0,1%*	*0,12%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*	*0,1%*
Leased products	38 572	39 947	40 216	40 632	41 166	41 794	42 504	43 287	44 133	45 035	45 987	46 987	47 892
Leased products (%contracts)	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*
Other investments	1	2	2	2	2	2	2	2	3	3	3	3	3
Other Investments (%Revenues)	*0,00%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*	*0,01%*
Other provisions	875	875	875	875	875	875	875	875	875	875	875	875	875
Other provisions (% Op. Expenses)	*3,6%*	*3,6%*	*3,5%*	*3,5%*	*3,4%*	*3,3%*	*3,2%*	*3,1%*	*3,0%*	*2,9%*	*2,8%*	*2,8%*	*2,7%*
Invested Capital on Financial Services	**123 212**	**127 250**	**130 170**	**133 310**	**136 646**	**140 158**	**143 836**	**147 674**	**151 664**	**155 803**	**160 088**	**164 519**	**168 962**
Other Non-Core Items													
Trade receivables	1	1	1	1	1	1	1	1	1	1	1	1	1
Financial Assets	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675	6 675
Growth	*-16.2%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Current tax	652	922	935	935	951	964	977	994	1012	1032	1055	1069	1085
Deferred tax	5	0	0	0	0	0	0	0	0	0	0	0	0
Deferred tax (%EBIT)	*57,4%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*	*113,0%*
Other assets	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816	11 816
Growth	*29,6%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Assets held for sale	461	0	0	0	0	0	0	0	0	0	0	0	0
Intangible assets	1	1	1	1	1	1	1	1	1	1	1	1	1
Leased products	0	0	0	0	0	0	0	0	0	0	0	0	0
Investments accounted for using the equity method	2 624	2 777	2 864	2 900	2 999	3 076	3 150	3 239	3 323	3 410	3 501	3 593	3 687
Growth	*-5,2%*	*5,8%*	*3,1%*	*1,2%*	*3,4%*	*2,6%*	*2,4%*	*2,8%*	*2,6%*	*2,6%*	*2,7%*	*2,6%*	*2,6%*
Other investments	738	738	738	738	738	738	738	738	738	738	738	738	738
Other investments (% Revenue)	*0,8%*	*0,8%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,7%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*	*0,6%*
Non-current Financial assets	1 010	2 028	2 028	2 028	2 028	2 028	2 028	2 028	2 028	2 028	2 028	2 028	2 028
Non-current financial assets (% Revenue)	*1,0%*	*2,1%*	*2,0%*	*2,0%*	*1,9%*	*1,8%*	*1,8%*	*1,8%*	*1,7%*	*1,7%*	*1,7%*	*1,7%*	*1,6%*
Other provisions	9	9	9	9	9	9	9	9	9	9	9	9	9
Trade payables	11	11	11	11	11	11	11	11	11	11	11	11	11
Other liabilities	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416	20 416
Growth	*10,4%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*	*0,0%*
Liabilities in conjunction with assets held for sale	62	0	0	0	0	0	0	0	0	0	0	0	0
Invested Capital Other Non-Core Business	**3 485**	**4 523**	**4 622**	**4 658**	**4 773**	**4 863**	**4 950**	**5 056**	**5 158**	**5 265**	**5 379**	**5 485**	**5 595**
Financial													
Excess of Cash	9 029	9 340	9 669	10 017	10 342	10 637	10 902	11 132	11 322	11 468	11 564	11 965	12 303
(% total cash and cash equivalents)	*82%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*	*79%*
Financial liabilities	103 597	106 350	109 177	112 079	115 058	118 116	121 255	124 478	127 787	131 183	134 670	138 249	141 923
Growth	*9,5%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*	*2,7%*
(D/E)	*180,0 %*	*183,3%*	*184,9%*	*186,0%*	*187,4%*	*189,5%*	*192,3%*	*195,9%*	*200,4%*	*205,9%*	*212,7%*	*214,4%*	*217,8%*
Pension provisions	2 330	2 612	2 928	3 283	3 680	4 125	4 625	5 184	5 812	6 515	7 304	8 188	9 179
Growth	*-28%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*	*12%*
Treasury Shares	0	0	0	0	0	0	0	0	0	0	0	0	0
Minority interests	529	533	537	541	545	549	554	558	562	566	570	575	579
Minority interests (% Equity)	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
Net Financial Assets	**-97 427**	**-100 155**	**-102 974**	**-105 886**	**-108 941**	**-112 153**	**-115 531**	**-119 088**	**-122 839**	**-126 797**	**-130 980**	**-135 047**	**-139 379**
Equity	**57 559**	**58 025**	**59 037**	**60 258**	**61 400**	**62 332**	**63 048**	**63 551**	**63 777**	**63 714**	**63 329**	**64 494**	**65 149**
Transactions with Shareholders	-2 715	-5 220	-4 964	-5 031	-5 359	-5 637	-6 002	-6 363	-6 743	-7 088	-7 421	-6 104	-6 806
Payout Ratio	*41%*	*92%*	*83%*	*80%*	*82%*	*86%*	*89%*	*93%*	*97%*	*101%*	*105%*	*84%*	*91%*

Cash-Flow Statement

	2018	2019E	2020F	2021F	2022F	2023F	2024F	2025F	2026F	2027F	2028F	2029F	2030F
Core													
Automotive													
NOPLAT	4 941	3 484	3 738	3 979	4 179	4 202	4 297	4 383	4 420	4 409	4 346	4 507	4 630
ROIC	20%	13%	15%	15%	15%	15%	15%	15%	15%	15%	15%	16%	16%
Depreciation	4 982	5 318	5 084	5 255	5 422	5 545	5 622	5 656	5 643	5 583	5 474	5 315	5 416
Depreciation (%PP&E t-1)	*27,6%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*	*27,4%*
Operational Cash Flow	**9 923**	**8 801**	**8 822**	**9 234**	**9 600**	**9 746**	**9 919**	**10 038**	**10 064**	**9 992**	**9 820**	**9 822**	**10 046**
Invested Capital - Fixed Assets	31 205	27 840	28 737	29 777	30 584	31 159	31 497	31 594	31 429	30 997	30 281	31 023	31 471
Gross CAPEX Investment	-2 514	3 365	-897	-1 040	-806	-576	-338	-97	165	432	716	-742	-448
Net CAPEX	-7 496	-1 952	-5 981	-6 295	-6 228	-6 120	-5 961	-5 752	-5 478	-5 151	-4 758	-6 056	-5 864
Invested Capital - Liabilities	-5 688	-5 273	-5 530	-5 791	-6 011	-6 189	-6 323	-6 409	-6 442	-6 420	-6 336	-6 565	-6 736
Net Investment from Liabilities	-29	-415	257	260	221	178	133	86	33	-22	-83	229	170
Invested Capital - NWC and Others	2 017	3 082	3 215	3 352	3 472	3 573	3 655	3 716	3 753	3 765	3 749	3 882	3 986
Investment in NWC and Others	-543	-1 065	-133	-137	-120	-101	-82	-61	-37	-12	16	-133	-104
Investment Cash Flow	**-8 068**	**-3 432**	**-5 857**	**-6 172**	**-6 127**	**-6 044**	**-5 909**	**-5 727**	**-5 482**	**-5 185**	**-4 826**	**-5 961**	**-5 798**
Free Cash Flow Automobiles	**1 855**	**5 370**	**2 965**	**3 062**	**3 473**	**3 702**	**4 010**	**4 312**	**4 582**	**4 806**	**4 994**	**3 862**	**4 248**
Motorcycles													
NOPLAT	130	154	166	177	188	192	201	212	222	232	242	253	264

ROIC	19%	20%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%
Depreciation	97	97	103	109	114	120	125	131	137	144	150	157	163
Depreciation (%PP&E t-1)	*25,0%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*	*24,4%*
Operational Cash Flow	**227**	**251**	**269**	**286**	**302**	**312**	**327**	**343**	**360**	**376**	**392**	**410**	**427**
Invested Capital - Fixed Assets	494	497	523	549	576	603	632	661	691	721	753	785	819
Gross CAPEX Investment	-49	-3	-25	-26	-27	-27	-28	-29	-30	-31	-31	-33	-33
Net CAPEX	-146	-101	-129	-135	-141	-147	-154	-161	-167	-174	-181	-189	-197
Invested Capital - Liabilities	-70	-104	-109	-115	-120	-126	-132	-138	-144	-151	-157	-164	-171
Net Investment from Liabilities	-31	34	5	5	6	6	6	6	6	6	7	7	7
Invested Capital - NWC and Others	330	365	384	403	423	443	464	485	507	530	553	577	601
Investment in NWC and Others	2	-36	-19	-19	-20	-20	-21	-22	-22	-23	-23	-24	-24
Investment Cash Flow	**-175**	**-102**	**-142**	**-149**	**-155**	**-162**	**-168**	**-176**	**-183**	**-191**	**-198**	**-206**	**-214**
Free Cash Flow Motorcycles	**52**	**149**	**127**	**137**	**147**	**150**	**158**	**167**	**177**	**186**	**194**	**203**	**213**
Free Cash Flow Core Business	**1 908**	**5 519**	**3 092**	**3 199**	**3 620**	**3 853**	**4 168**	**4 479**	**4 759**	**4 992**	**5 189**	**4 065**	**4 461**
Non-Core													
Operational Cash Flow	1 799 126	2 368	2 402	2 433	2 481	2 530	2 584	2 644	2 709	2 777	2 851	2 922	2 991
Invested Capital	698	131 773	134 792	137 968	141 419	145 022	148 786	152 730	156 822	161 068	165 467	170 003	174 557
Investment Cash Flow	-6 888	-5 075	-3 019	-3 176	-3 451	-3 602	-3 765	-3 944	-4 092	-4 246	-4 399	-4 536	-4 554
Free Cash Flow Non-Core Business	**-5 089**	**-2 707**	**-617**	**-742**	**-971**	**-1 072**	**-1 181**	**-1 299**	**-1 383**	**-1 469**	**-1 548**	**-1 615**	**-1 563**
FREE CASH FLOW	**-3 182**	**2 812**	**2 475**	**2 457**	**2 650**	**2 780**	**2 988**	**3 180**	**3 375**	**3 523**	**3 641**	**2 450**	**2 898**
Financial													
Financial Result	-267	-321 -100	-329 -102	-337 -105	-346 -108	-355 -112	-364 -115	-374 -119	-383 -122	-393 -126	-403 -130	-414 -135	-424 -139
Net Financial Assets	-97 427	155	974	886	941	153	531	088	839	797	980	047	379
Investment in Net Financial Assets	6 164	2 729	2 818	2 912	3 056	3 212	3 378	3 557	3 751	3 958	4 183	4 067	4 332
Net Cash Transactions with Shareholders	-2 715	-5 220	-4 964	-5 031	-5 359	-5 637	-6 002	-6 363	-6 743	-7 088	-7 421	-6 104	-6 806
Financing Cash Flow	**3 182**	**-2 812**	**-2 475**	**-2 457**	**-2 650**	**-2 780**	**-2 988**	**-3 180**	**-3 375**	**-3 523**	**-3 641**	**-2 450**	**-2 898**

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Buy	Expected total return (including expected capital gains and expected dividend yield) of more than 10% over a 12-month period.
Hold	Expected total return (including expected capital gains and expected dividend yield) between 0% and 10% over a 12-month period.
Sell	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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MILESTONES IN THE EV INDUSTRY

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26008

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Abstract

The continuous expansion of electric mobility is deemed to revamp the automotive industry. New market trends, challenges and risks arise with it and will undoubtedly influence BMW's valuation. For the purpose of the report both a qualitative and quantitative analysis on the sector were pursued in order to assess the impact of electrified mobility in the performance, product offering, price-mix and value of the BMW Group.

Keywords

Electric Vehicles, BMW, Future of Mobility, Sustainability.

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Motivation

Electric mobility rapid growth is a central topic of analysis as it impacts BMW's product offering, price-mix, performance and consequently the Group's valuation. At a time where the private sector is proactively reacting to greener policies, through intentions of further electrifying their models, it is relevant to perceive what are the **electric-vehicle (EV) major market trends, challenges and risks** and how do those reflect in the firm.

From 2014 to 2018, electric and plug-in hybrid car sales for BMW grew at a CAGR of 51.63%, with EVs representing a proxy 6% of the automaker's total deliveries. Additionally, BMW is investing in transforming their product-mix, of which more than half will be fully electric models by 2023. In our model, we forecast **EVs to represent 73% of the Group's total deliveries by 2035, hence translating into a CAGR of 13.95%.**

Likewise, it is crucial to scrutinise the EV market development and to take a **regional perspective**, such that our forecasts for BMW's electric[1] deliveries per each primary market are portrayed as accurately as possible.

EV Market

In 2018, global EV new car registrations almost doubled previous year's figures. The global EV car fleet was up 2 million and exceeded 5.1 million vehicles. Such portrays **electric mobility rapid pace of development** and supports electrification to rank as the second top priority for executives[2] in the auto industry, right after digitalisation and connectivity.

This boom has been majorly driven by **regulatory measures and industrial policies** and is expected to persist this way. Regulators views will likely continue to drive OEM's agenda, which means the **individuality from external factors from country to country will continue to lead to distinct**

[1] Electric deliveries for the BMW Group encompass both fully electric cars and plug-in hybrid electric vehicles.
[2] According to KPMG Executive Global Auto Survey 2019.

regional performances. Accordingly, as there will never be a global industrial policy one cannot expect a uniform global technological agenda nor an alike drivetrain solution – which is reflected in our model, as each primary geography has different EV deliveries considerations.

Among the major policies and regulations fostering the growth of EV adoption there are the **fuel economy, emission standards, financial incentives (e.g. government subsidies) and city access restrictions.** City access restrictions are already taking place in 20 major urban areas worldwide, that have announced to ban gasoline and diesel cars in the very near future: Oxford (2020), London (2025) and Paris (2030).

Uber's Clean Air Plan to Help London go Electric demonstrates these policies' influence over the private sector. As Uber aims that all cars in the app are fully electric in London by 2025, the e-hailing company is assisting every Uber driver to move into an EV, by charging a minimal value of 15p per mile on every trip booked through the Uber app in London.

These policy mechanisms intent to make **EVs more affordable and, thus, more appealing to both private and business customers**. Table I summarizes EV related policies in BMW's primary regions, while Exhibits I and II depict the official dates each primary region announced for the ban of diesel car sales.

Table I: EV Related Policies (* indicates policies were only applied at a province/local/state level)

		China	EU	US
Regulations (vehicles)	ZEV mandate	✓		✓*
	Fuel economy standards	✓	✓	✓
Incentives (vehicles)	Fiscal incentives	✓	✓	✓
Target (vehicles)		✓	✓	✓*
Industrial policies	Subsidy	✓		
Regulations (chargers)	Hardware standards**	✓	✓	✓
	Building regulations	✓*	✓	✓*
Incentives (chargers)	Fiscal incentives	✓	✓	✓*
Targets (chargers)		✓	✓	✓*

Note that without such incentives, fuel economy and emission standards would hardly be met in all major markets, particularly in the EU and China, as the EV market needs to grow substantially. For example, **for EU fleet CO_2 emission targets to be met, plug-in hybrids and battery electric cars market shares need to reach a combined 10% by 2025 and 22% in 2030.** Given the challenges related to EV adoption, these must be considered alongside possible delays.

Challenges and Mitigations

To accelerate and ensure sustainable and profitable growth in the EV industry there are several challenges to overcome. Firstly, glancing the consumer side, the **major barriers encountered for EV adoption are price (35%), followed by charging (24%) and range (18%).**

Price as a primary barrier reinforces the idea previously stated of the financial incentives' relevance for the encouragement of EV adoption. If such encountering is not to be mitigated it could be a deal breaker for the abovementioned countries to reach their emission targets and successfully ban the sale of diesel cars on the mentioned official dates. If consumers are not appealed by EVs this gap can break the expected supply/demand linkage.

Nevertheless, as **EV prices cost of ownership converge towards their internal-combustion (IC) vehicles counterparts, price no longer is a barrier.** We expect such to happen by 2025, with a slight delay when compared to Deloitte's estimation of 2022.

Exhibit I: Ban on IC Vehicle Sales (Year)

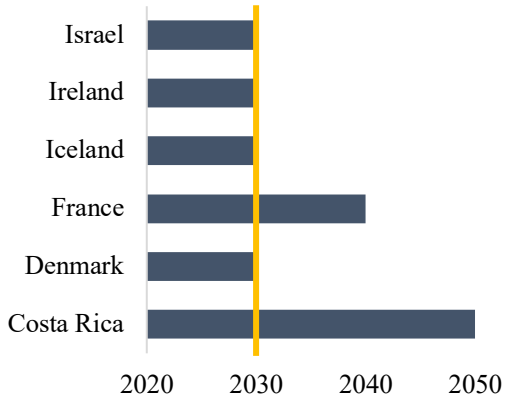
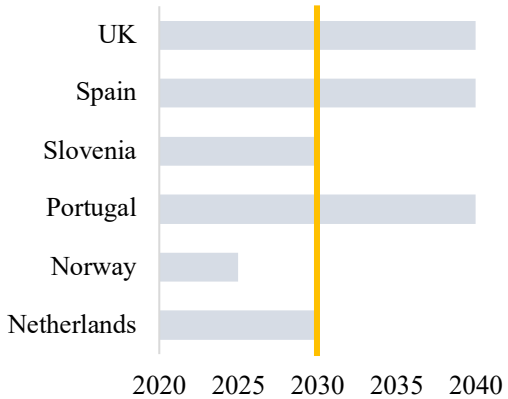


Exhibit II: Ban on IC Vehicle Sales (Year)



Our 2025 forecast is explained by the increased importance battery-related raw materials and potential shocks in the supply chain, given the role of lithium, cobalt and nickel. Limited natural resources access, availability and geographical concentration make us believe there can be, potentially, price spikes that will justify for EVs to cost more than ICs for longer. On this note, it is relevant to highlight **we are optimistic that the need for critical raw materials will diminish as the 3R (reduce, reuse, recycle) framework gets into place.**

In what regards recycling, several countries have already set standards for **battery waste management,** such as the recycling rate for the entire battery. Additionally, there are efforts to develop a regulatory framework for environmental requirements on the design phase of battery products in order to **maximise the recovery of materials at battery end-of-life treatment, while reducing costs.** Such measures are positive in what regards lower EV prices in the future as well as raw materials' supply sustainability to empower the needed EV market grow.

On the second concern, the **charging time and infrastructure, we believe this issue will tend to diminish over time.** As the next generation of BEVs has a higher range, home and workplace charging gets more than sufficient. Plus, ultra-fast charge stations are expected to serve more BEVs, it is estimated that the time required for 80% charge will be reduced to only 30 minutes by 2025.

Moreover, there are **increased efforts over charging infrastructure policies.** In the EU countries are required to set the deployment of publicly accessible chargers in 2020, which is expected to translate into one charger per each ten cars. In the case of China, the country plans to deploy 12,000 stations to swap batteries and 500,000 publicly accessible chargers to serve a proxy 5 million EVs by 2020. Plus, more than 30 cities in China offer incentives for private home and public charging. This will also mitigate range concerns and foster electric 1readiness.

Lastly, there are **structural barriers per se, especially among the provision of energy.** Energy providers claim that infrastructure enhancement goes beyond implementing more charge points and that it must include the improvement of the necessary backbone to avoid power grid overloads and shortages of general power supply. In our view this is the most complicated challenge to mitigate and will be the major cause underlying a slower EV rate of adoption.

Impact on Valuation

Given the abovementioned considerations, Exhibit III summarizes the dates by which we believe the ban of diesel car sales will be effective by each primary market for BMW. Accordingly, by 2035 Germany will be the Group's primary market with the highest share of EV deliveries (97%), followed by the UK (76%), China (75%) and, lastly, the US (50%). **Such translates into distinct CAGRs: Germany (16.25%), UK (17.87%), US (13.62%), China (17.75%).** This being said, both the UK and China are the most attractive markets for BMW in what regards the trend towards electrification.

Exhibit III: Dates for IC Diesel Sales Ban Estimated

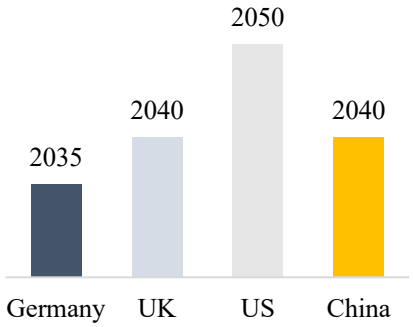


Exhibit IV: Weight of EVs in BMW Total Deliveries per Geography

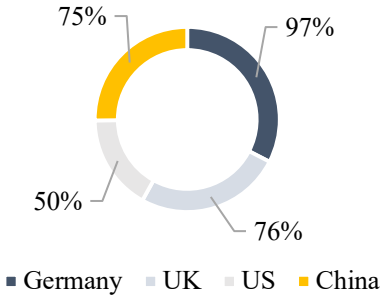
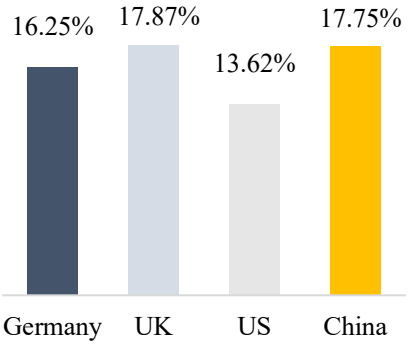


Exhibit V: CAGRs on EV Deliveries 2019-2035 (%)



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